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ON

THE INDUCTIVE PHILOSOPHY

A. ELLEY FINCH

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A DISCOURSE

ON

THE INDUCTIVE PHILOSOPHY

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ON

THE INDUCTIVE PHILOSOPHY

INCLUDING A PARALLEL BETWEEN

LORD BACON AND A. COMTE AS PHILOSOPHERS

A DISCOURSE

DELIVERED BEFORE THE SUNDAY LECTURE SOCIETY

NOV. 26, 1871

BY

A. ELLEY FINCH

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265. e. 198.

SYLLABUS.

Aphorism of the Astronomer Kepler on Theology and Science. —Kepler's conclusions now taught as commonplaces.

All knowledge distributable into Theological, Metaphysical, and Scientific.—These methods explained.—Theological and Scientific distinguished, and illustrated by references to the causes of: The Weather (theological); The Tides (scientific).—Is this world governed by God's Supernatural Will (as taught by Theology), or by His Natural Laws (as taught by Science)?—The Faith of Science, her Mission and Evidences.—State of the Sciences and Philosophy in the time of Bacon and Galileo.

The Inductive Philosophy, first so named and expounded by Lord Bacon, explained as a method, based on Science, aiming to harmonise the course of Human Life with the sanctions of the Natural Laws.

Progressive state and extent of the Sciences in the time of Comte.—Comte, as an Inductive Philosopher, builds on Bacon's foundations, seeking to show, from an analysis of Scientific Discovery, and a review of Modern History, that the phenomena of Society and Morals, as well as those of Individual Life, are regulated by the Natural Laws.

Bacon and Comte: a parallel.—Diversity of Style.—Similarity of Genius.

Objection, that the Inductive Philosophy omits the spiritual part of Man's Nature: answered.

Objection, that it is a system of Materialism: answered.

Fruits of the Inductive Philosophy.

Hooker's eloquent Exhortation to reverence the Divine Natural Law.

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'The great truths, that Natural and Divine operations are one, and that the laws of Nature are Divine thoughts' . . .

'If the laws of our reason did not exist in Nature, we should vainly attempt to force them upon her; if the laws of Nature did not exist in our reason, we should not be able to comprehend them.'

OERSTED'S *Soul in Nature* (The Spiritual in the Material).

THE

INDUCTIVE PHILOSOPHY.

AN ILLUSTRIOUS ASTRONOMER, who flourished about the time of the invention of the telescope[1]—a period when inquisitive and reflecting minds were beginning to perceive the difficulty of reconciling the discoveries of Physical Science with the Theology of the Christian Fathers—has left on record these memorable expressions:—'In Theology we balance authorities; in Science we weigh reasons. A holy man was Lactantius, who denied that the earth could be round. A holy man was Augustine, who, granting the earth's rotundity, denied the antipodes. A holy thing to me is the Inquisition, which, allowing the smallness of the earth, denies its motion. But more holy to me is Truth; and hence I prove, by Science, that the earth is round, is inhabited on every side, is of small size, and in motion among the stars.'[2]

---

[1] Note A, p. 44.

[2] 'In Theologia quidem authoritatum, in Philosophia vero rationum, esse momenta ponderanda. Sanctus igitur Lactantius, qui terram negavit esse rotundam: Sanctus Augustinus, qui, rotunditate concessa, negavit tamen antipodas; Sanctum Officium hodiernorum, qui, exilitate terræ concessa, negant tamen ejus motum; at magis

We are living at a time, in the progress of human society, when these conclusions, with which the courageous Kepler startled the learned world of the seventeenth century, have come to be taught as common-places to children in our national elementary schools!—a time when it is generally acknowledged that man possesses no other means for the attainment of truth than his natural intelligence, acting normally, in accordance with its known constitution or observed functions; although it must be admitted the precise nature, number, and power of the intellectual faculties are still matters of controversy, so that, on the most serious subjects—What is Truth?—how can it be known to be such, or become capable of being verified, or tested, as Truth?—are enquiries upon which great difference of opinion prevails; wherefore, when we attempt a survey of the field of knowledge in its entirety, we find it distributable into three principal divisions, corresponding not only to apparent differences in knowledge itself, but to the several methods which the mind has pursued in its search after truth—methods which, for our present purpose, are sufficiently denominated the Theological, the Metaphysical, and the Scientific.

---

mihi sancta Veritas, qui, terram et rotundam, et antipodibus circumhabitatam, et contemptissimæ parvitatis esse, et denique per sidera ferri, salvo Doctorum Ecclesiæ respectu, ex Philosophia demonstro.'—Kepler, *De Motibus Stellæ Martis, ex Observationibus G. N. Tichonis Brahe*, fol. Pragæ, 1609. Introductio. The entire scope and argument of this extraordinary treatise show that 'Philosophia' is used to denote what we now more distinctly term 'Science.'

Note B, p. 46.

Now a question here presents itself—Are these methods of equal authority, or are certain branches of knowledge duly authenticated by one method, whilst certain other branches of knowledge are duly authenticated by another method?—a question which, even with our present enlightenment, it is perhaps not easy to answer, but towards the solution of which we shall, I think, make some approach whilst we are considering shortly what is the distinguishing, or characteristic, test or standard of truth upon which each of these methods more particularly relies. Considered separately, their several standards or tests may be stated generally as follows. The theological method considers that our most important knowledge is derived from sacred scriptures, or the traditions and writings of holy men of old, either as revealed by God therein, or as plainly deducible by logical inference therefrom; and it considers that life on earth is providentially governed by the will of God, acting in human affairs in the manner so frequently alluded to in such scriptures. That such will is indeed, as to much that takes place on earth, inscrutable, and especially so in reference to that vast amount of existing misery and evil, in the very midst of which we, in this metropolis, may truly say 'we live and move and have our being;' yet that this Divine Will, however mysteriously manifested, is ever operative for wise and beneficent purposes; and that man himself possesses the means of influencing it in his favour by holiness of life, and by prayer, directly addressed to Deity; and the test or standard of truth, as held by the theological school, is therefore the will of God, principally made known to us, and influenced in the manner I have mentioned.

The metaphysical method[1] considers that the test or standard of truth is to be sought for in the human faculties themselves. That real knowledge can only result from studying and analysing our ideas and sensations, and that the test of truth lies in the consciousness of man; so that, what the consciousness thoroughly believes to be true, and of which no further explanation seems possible, is an ultimate fact of consciousness, and therefore is, indeed, Truth itself.

The scientific method is remarkably distinct from the two other methods to which I have been briefly referring, and the distinction consists essentially in this: that the scientific method considers that real knowledge, such as the human mind can clearly comprehend, or feel positively certain about, or have indisputably proved, is only to be derived from observation and experience of nature, and the study of her invariable laws.[2] Laws of nature being a term used by our finite intelligence to denote those constant co-existences and sequences, or uniformity of relations, observable in the phenomena around us. Phenomena being a term denoting the appearances things present to our notice as distinguished from their essence or real nature, of which our senses can usually tell us nothing. Of these laws of nature, or God's natural laws, science has discovered a vast number,[1] and has verified them, as governing, to a great extent, the course of life on earth; and the scientific school considers that the only reliable means which humanity possesses for ascertaining and testing such truth are our ordinary human powers, that is to say, our senses and our reflective faculties exercised upon, or in connection with, the information that our senses have supplied.

---

[1] 'Examination of the Method employed by Metaphysicians.' Buckle's *History of Civilisation*, vol. i. chap. iii., and the authorities there collected, especially Locke's *Essay concerning Human Understanding*, Stewart's *Philosophy of the Human Mind*, J. Mill's *Analysis of the Phenomena of the Human Mind*, Sir W. Hamilton's *Discussions, &c.*; and see Mansell's *Metaphysics*, Black, 1860.

[2] 'The basis of all our real knowledge is the reliance we place on the constancy and precision of Nature.'—Mackay's *Progress of the Intellect, &c.*, 'Intellectual Religion,' sec. 7; and see Cumberland's *De Legibus Naturæ Disquisitio Philosophica* (published in 1672). In this work 'the schoolmen and fathers, the canonists and casuists have vanished like ghosts at the first daylight; the continual appeal is to experience and never to authority,'—Hallam's *Lit. of Europe*, vol. iii. p. 400, ed. 1854.

It must be obvious, from the foregoing explanation, that the views of the course of life, and the order of God's providence, on earth, that suggest themselves to the scientific thinker are essentially different from those that are entertained by the theologian. According to the theological theory, all things are regulated upon the principles to be collected from the study of the sacred Scriptures, in other words, by God's arbitrary will. According to the scientific theory, all things are regulated according to God's natural laws, which it is the province of science to discover. And again, the general test of right conduct in life must often be essentially different. According to the theological theory, misery, unhappiness, sickness, the premature deaths of children, the agony of bereaved parents, are the direct result of the supernatural will of God, and are sent or occasioned for some special purpose of Divine justice, or, possibly even, are the blessings of a veiled benevolence, however to us inscrutable. According to the scientific theory, everything that happens on earth is the direct result of obedience to, or violation of, God's natural laws. That these laws have human happiness as their chief end in view, and that all misery or unhappiness, disease, premature deaths and bereavements, are distinctly traceable to the infringement of such laws, or, in other words, to the disregard of the will of God, their omniscient and beneficent author, with whom, we are told, 'there is no variableness, neither shadow of turning.' Again, according to the theological theory, prayer to God, to avert or lighten by his will such inflictions, is the direct remedy for the sufferer. According to the scientific theory, increased knowledge of the laws that have been broken, and increased care to regulate our actions in accordance with their dictates, is the mode by which misery and calamity are to be alleviated or averted.[1]

---

[1] 'It is the nature of the human mind to desire and seek a law. . . . All nature bears the impress of law. . . Science is, in brief, the pursuit of law.'—'On the Importance of the Study of Economic Science,' by W. B. Hodgson, LL.D.: *Modern Culture*, Macmillan, 1867.

This fundamental distinction that exists between the theological and scientific methods will be found yet more strikingly manifest on looking a little closely at the foundations on which they respectively rest—viz., science and theology. Let me here remark, that I am not using the term 'theology' as synonymous with 'religion,'[1] and that, whether we seek, with the theologians, to discover the will of God in the book of his word, or, with the men of science, in the book of his works (volumen operum Dei), I submit that there cannot be any ultimate conflict of real results. For, however numerous may be systems of theology, we can only believe in one Divine Will; and, however we may define our idea of the dominion of Deity on earth, whether by the theological phrase, 'Arbitrary Supernatural Will,' or by the scientific term, 'Invariable Natural Law,'[2] if the teachings of theology and science be found in opposition, there must be human error on the one side or the other.

---

[1] 'Millions of prayers have been vainly breathed to what we now know were inexorable laws of nature.'—Lecky's *Hist. of European Morals*, chap. i. p. 56.

Science, then, it will be observed, is founded upon enquiry, whilst theology is founded upon authority. Science takes for its basis human experience. Theology certain principles, accepted as supernaturally revealed, and which it must therefore be impious to question. In the one, it is the spirit of doubt; in the other, the spirit of belief, that is the animating principle. Theology regarding belief as a virtue, whereas science encourages doubt, or scepticism,[1] as an invaluable intellectual quality, or mental attitude, that compels the mind to withhold belief until it is satisfied with proof. Theology being founded on belief, gives us faith. Science, being founded on enquiry, gives us knowledge; a distinction not without a difference—'for,' says the logical Chillingworth, 'faith is not knowledge, no more than three is four . . . . for he that knows, believes, and something more; but he that believes many times doth not know; nay, if he doth barely and merely believe, he doth never know.'[2] In Science, originality is the parent of discovery, and therefore a merit; in Theology it is the parent of heresy, and therefore a reproach.[3]

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[1] 'Theology is not Religion itself; it is men's thoughts about Religion. There is but one Religion, though many Theologies.'—Theodore Parker, *Discourse on Matters pertaining to Religion*, chap. iv., 'Idea of Religion.'

'Theology and Religion are two wholly different things. Religion may exist without a theology at all.'—Morell's *Hist. of Speculative Philosophy*, vol. i. Appendix.

Theology strictly (or as used in the text) is the deductive or logical exposition of Religion (regarding Religion as embraced by revelation), so far as it admits of such an exposition.—'Theology,' *Penny Cyclopædia*.

Theology probably bears a somewhat similar relation to Religion that Astrology bore to Astronomy, and Alchemy to Chemistry.

[2] Note C, p. 51.

The abstract distinctions I have been pointing out will be more clearly apprehended by means of the two following illustrations:—

The Natural Law, or the Supernatural Will, whichever it be, that regulates or causes changes in the weather, has not as yet been sufficiently studied to allow our knowledge of such changes being reduced to scientific treatment. The theological theory attributes them to the arbitrary inscrutable will of the Deity. It is not possible, therefore, for the agriculturist to arrange his operations of seed sowing, manuring, or rotation of crops, so as to be at all certain that these shall, in their future growth, become influenced by such an amount of rain and sunshine as he may know by experience are necessary for their mature development. His forecast of the weather may prove utterly fallacious, and his crops be in danger of perishing, for lack or superabundance of those essential agents, heat and moisture. The theory being theological, the only remedy to be resorted to is theological also; and the state of the weather being believed to depend upon the arbitrary will of the Deity, prayer is offered up to induce the Almighty to alter or dispose his will in accordance with the farmer's necessities, so 'that we may receive the fruits of the earth in due season;' and it is probably within the personal experience of some of you to have heard such prayers uttered with earnest devotion in your several churches.'[1]

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[1] 'Men who desire to learn,' said Aristotle, 'must first learn to doubt; for science is only the solution of doubts.' . . . . 'In every case science welcomes scrutiny and scepticism.' (G. H. Lewes's *Aristotle*, pp. 38, 40.) 'The truth is, we intend and propose the art of doubting properly.' 'Nos vero non *acatalepsiam*, sed *eucatalepsiam* meditamur et proponimus.'—*Nov. Org.*, lib. i., aph. 126.

[2] Chillingworth's *Religion of Protestants*, &c., chap. vi. vol. ii. p. 316, ed. Oxford, 1838, 'Chillingworth's Works.' See also on this distinction J. S. Mill's *Exam. of Sir W. Hamilton's Philosophy*, chap. v., 'Belief without Knowledge.'

[3] 'Antiquity is a mark of truth, and novelty is a mark of error in religion.'—Harold Browne's (Bishop of Ely) *Exposition of the Thirty-nine Articles*, p. 177, 3rd ed., where the context shows that by Religion is meant Theology.

Now the scientific theory considers that the weather, like other natural phenomena, is really regulated, not by arbitrary inscrutable will, but by invariable, discoverable law,[2] and that our present ignorance upon the subject must, sooner or later, be dissipated by the discovery of such law; and that, when our knowledge of the weather has thus come to be a portion of scientific knowledge, science will be able to guide and protect the agriculturist, in reference to the future state of the weather, with as much certainty as it now guides and protects the mariner, in reference to the future depth of the water, which will be found at a given time, in the port for which his vessel may be bound.

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[1] Note D., p. 59.

[2] Leslie's *Natural Philosophy*, p. 405; Dr. Whewell's *Bridgewater Treatise*; Snow Harris, *Brit. Assoc. Rep. for* 1844, p. 241.

How science is enabled to do this shall be the subject of my second illustration.

Sir Isaac Newton discovered that all the various portions of matter, of which the mind can acquire knowledge, are imbued with the power of attracting one another;[1] and this power has now been so extensively verified, as to be susceptible of the following precise expression—viz. 'Every particle of matter in the universe attracts every other particle with a force directly proportioned to the mass of the attracting particle, and inversely to the square of the distance between them.'[2] The size of the earth has been ascertained by science. The mass and distance of our moon have, by like means, been measured, and the scientific application to these bodies of Newton's great law has shown, that the rising and falling of the water at the mouths of rivers and along sea coasts, so familiarly known to you as the tides, are mainly owing to the attraction exerted by the moon on the earth's surface, whereby the fluid water is drawn away from those parts which lie at the greatest distance from the moon's influence, and is drawn up, in a heap as it were, on those parts which lie vertically under, or nearest to, the moon, forming thereby respectively high and low tides.[1] But science has also succeeded in measuring the enormous relative size of our sun, and its immense relative distance from the earth, and has thus been able to ascertain precisely the amount of attraction which the sun exerts upon the earth's surface; and science, having also calculated the respective motions of the earth and moon, can foretell with certainty their respective future positions in relation to the sun, and thereby ascertain whether, at any stated future time, the attractive influence of the sun will be in augmentation of the moon's attraction, or whether it will be in direct opposition to it; and can, therefore, with like certainty, predict when and where will happen those very high or spring tides, or those very low or neap tides, of which many of you may have been witnesses, and all must have heard.[1] And thus a class of phenomena, which little more than a century ago were regarded, like the weather, as inexplicable, have been traced to the operation of invariable laws, and the great theory of the tides is now shown to have this scientific sanction, viz., the fulfilment of its previsions so exact as to guide our conduct. You can now understand how science is enabled to give such information to the mariner as will enable him to fix beforehand the hour at which his vessel, on arriving in its destined port, shall find sufficient water to allow him to place it safely in connection with the shore; and you can appreciate how much to science are owing the speed, safety, and precision that characterise the 'Tidal Services' between this country and the continent.

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[1] Newton's *Principia*, book i. pro. 17, 75. The argument in this immortal work proceeds by showing first the apparently provisional character of the law of gravitation from a superficial consideration of the lunar orbit (as a circle described with an average mean velocity), and then elevating it to the rank of a general and primordial relation by proving its applicability to the state of existing nature in all its circumstances.—*Newton's Principia*, by Lord Brougham; *Dissertations to Paley's Natural Theology*, vol. ii.; Sir J. Herschel's *Astronomy* (446), 3rd ed., 1850.

[2] Sir J. Herschel's *Astronomy* (445).

'Every doubt which has been raised with regard to the universality and accuracy of the law of gravitation has ended in confirming the rule.'—Whewell's *Philosophy of the Inductive Sciences*, vol. i. p. 257, 2nd ed., 'Establishment of Universal Gravitation.'

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[1] Centripetal tides. 'The link between celestial and terrestrial physics;' 'the celestial explanation of a great terrestrial phenomenon.' On this interesting subject of 'The Tides,' see *Elements of Physics*, by Neil Arnott, M.D., F.R.S., 6th ed., 1865, Longmans, vol. ii.; *On Astronomy, The Tides* (1309); Sir. J. Herschel's *Astronomy* (752), p. 497, 3rd ed.; and article 'Waves and Tides' (Prof. Airy), *Penny Cyclopædia*; and Mrs. Somerville's *Connexion of the Physical Sciences*, sec. xiii.

Sir W. R. Grove, in his admirable *Discourse on Continuity* (Longmans, 1867), has ventured upon a prediction to the effect that Saturn's ring may eventually be the means of our discovering how our solar system developed itself. I will venture upon an analogous assertion, viz., That a generally diffused knowledge of the causes of the tides, not simply as fact, but as the philosophy of fact, would in itself be sufficient to banish superstition from the face of educated society.

The human mind, contemplating the two theories, or systems, which I have been contrasting, concerning God's secular providence, and the relation in which man must stand towards them, seems so constituted as to find itself irresistibly impelled to ask the question,

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[1] 'This alternate mutual reinforcement and destruction of the solar and lunar attraction causing what are known as the spring and neap tides, the former being their sum and the latter their difference.' —Herschel's *Astronomy* (752).

How, and upon what principle, does the Almighty govern this world? Is it directly, by the operation of his arbitrary, supernatural, inscrutable will; or is it indirectly, by the operation of his invariable, natural, discoverable law; or can it be partly by the one, and partly by the other?

If, and to the extent to which we are governed by invariable laws, it must be most important that we should know them; and equally important is it that we should be instructed how to regulate our lives in accordance with their dictates.

Now, Science claims to be a revelation;[1] and none the less sacred that it has been a continuous disclosure, through the medium of man's natural intelligence, of the established order of the universe, and the method of the Divine government on Earth; and it is the faith of science that this world, so far as it can be comprehended by the human reason, is governed by God's natural laws.[2] A faith, not exactly childlike, nor yet lacking reverence, and simple as that of

'The poor Indian, whose untutored mind
Sees God in clouds, or hears him in the wind.'[3]

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[1] Herbert Spencer's *First Principles*, chap. i., 'Religion and Science,' sec. 6.

'Reason is natural revelation, whereby the eternal Father of Light and Fountain of all Knowledge communicates to mankind that portion of truth which he has laid within the reach of their natural faculties.'—Locke's *Essay concerning Human Understanding*, book iv. chap. xix. sec. 4.

[2] 'That God governs the world by general fixed laws, and that he has endowed us with capacities of reflecting upon this constitution of things.'—Butler's *Analogy of Religion*, &c, part i. chap. iii., 'Of the Moral Government of God.'

[3] Pope's *Essay on Man*, Ep. i. 99.

Science proclaims it to be her mission to teach a knowledge of these laws; and she offers for our examination overwhelming evidence in support of her faith.

Now, it is the aim and object of the Inductive Philosophy, planting her stand firmly on Science, to supply an intellectual method whereby we may learn how to harmonise the conduct of life with the sanctions of the natural laws.

The student of theology whose anxiety to arrive at truth may have led him to pursue his search after the origin of some dogma until he has succeeded in detecting it amidst the subtleties of the scholastic metaphysics of the middle ages, is aware that about the thirteenth century traces are to be met with of the germs of the inductive philosophy. In the intellectual contest that was then being carried on between the Nominalists and Realists, as they were barbarously termed, but which was a real struggle between reason and authority, he finds that, whilst on one side men were taught to distrust the evidence of the senses and conclusions from experience, they were, on the other side, led to think more for themselves, and examine their own convictions—to look to the external evidence by which assertions might be supported. It is, however, to our immortal countryman, Lord Bacon, that we must turn for the first complete exposition of that system of thought to which he gave the name Inductive Philosophy. It is, indeed, a prevailing popular opinion that Lord Bacon was its inventor or discoverer, and every student of his writings well knows with what admirable precision and force he has explained and illustrated the inductive method of research; and the powerful impression which so masterly an analysis has made upon subsequent thinkers has undoubtedly contributed to sustain such prevailing opinion. It has also been popularly believed that Bacon was the first man who rose up against the philosophy of Aristotle when at the height of its power. Yet, strictly speaking, if there be any one who could rightly be regarded as the father of the inductive philosophy, it is Aristotle himself; for he it was who first conceived and announced its primary principle, proclaiming with a clearness never yet excelled, that facts derived from observation and experience were the only grounds of real knowledge; and that our ideas, even the most abstract, have their origin in our sensations;[1] and a probable cause why the analytical and encyclopædic intellect of Aristotle never proceeded practically on the inductive method was owing to the physical sciences not being in existence, fitting instruments of research uninvented, and laws of nature nearly unknown. There was no sufficient field of experience to resort to, for the purpose either of generalising facts, or of verifying inductions by an appeal to experiment, the only means whereby hypothesis and theory can be efficiently tested. It is true, indeed, that the dialectical subtleties of the Schoolmen, which in Bacon's day tyrannised over the human mind, having been for the most part elaborated from or fortified by corrupt translations and vitiated versions of Aristotle's works, had come to be generally designated as the Aristotelian philosophy; a misnomer, however, inducing a profound and accurate scholar, the humane and accomplished Grotius, to declare 'that truth, in the service of which Aristotle had faithfully spent his life, suffered no oppression so great as that which was inflicted in Aristotle's name.'[1] Yet Bacon's great merit rather lay in concentrating the few and scattered lights of his predecessors, reducing to rule what others had effected fortuitously, and fixing the world's attention on the distinguishing characteristics of true and false philosophy, by a felicity of illustration peculiar to himself, irradiated by the luminous power of his bold and figurative eloquence.

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[1] See the passages from Aristotle's Works, supporting the statement in the text, collected in G. H. Lewes's 'Aristotle,' a chapter from the *Hist. of Science*, pp. 45–100; and *Hist. of Philosophy*, 'Aristotle's Method,' vol. i. pp. 284–296.

At the time when Bacon wrote, science, properly so called, was only in its dawn. Astronomy, now the queen of the inductive sciences, was gradually emerging from astrology; Gilbert was still experimenting on the singular properties of the magnet; Harvey was on the point of discovering the circulation of the blood; and Descartes was about to illumine the mathematical world by his brilliant discovery of the possibility of applying algebra to the geometry of curves,[2] and his explanation of the true causes of the rainbow; but, so modern is the true scientific spirit, that no one, so far as is known, had, previously to Bacon's great contemporary Galileo, ever correctly observed the simple phenomena of a falling body; and it is interesting to remark, that it was Galileo's discovery,[1] viz., that the velocity and the space traversed are proportioned, the one to the time and the other to its square, that paved the way for the grander discovery of gravitation by Sir Isaac Newton.

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[1] Grotius, *De Jure Belli ac Pacis*, &c., proleg. sec. 43. 'Ita ut veritas, cui Aristoteles fidelem navavit operam, nulla jam re magis opprimatur quam Aristotelis nomine.'

[2] Descartes was the first who expressed curves by algebraic equations. Montucla, *Hist. des Mathémat.*, vol. i. pp. 704, 705. 'A discovery which constitutes the greatest single step ever made in the progress of the exact sciences.'

J. S. Mill's *Exam. of Sir W. Hamilton's Philosophy*, pp. 531, 533, wherein is contained a very lucid explanation of the nature and practical application of this happy discovery of Descartes.

But Bacon had thought a good deal about philosophy, such as it then was, for, he observes: 'We must speak out plainly and declare that our philosophy, which we have derived principally from the Greeks, seems to be but a childhood of knowledge, apt for idle talk, but immature for generating anything: of controversies, rank and fertile, but of works barren and fruitless.'[2] This opinion, by the way, of the practical worthlessness of the Greek Philosophy was not new, and perhaps even now it is not old. There may be some still ready to concur with Cicero[3] in thinking that a single page of a Roman Jurist contains more solid and exact matter[4] than whole libraries of the works of

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[1] Whewell's *Hist. of the Inductive Sciences*, vol. ii. p. 32, 2nd ed., 'Inductive epoch of Galileo.'

[2] *Instauratio Magna.* Præfatio.

[3] 'Dicam quod sentio: bibliothecas omnium philosophorum unus mihi videtur xii. tabularum libellus, si quis legum fontes et capita viderit, et auctoritatis pondere et utilitatis ubertate, superare.'—Cic. *De Oratore*, i. 44.

[4] 'Sparks from all the sciences are raked together in the ashes of the law.'—*Law, or a Discourse thereof*, by Sir Henry Finch, Knight, His Majesty's Serjeant-at-Law, book i. chap. iii., Henry Lintot, 1759.

Greek philosophers,[1] who are elsewhere alluded to by Bacon as 'idle old men talking to ignorant young ones.'[2]

The leading idea of the inductive philosophy is based upon the scientific discovery of the uniformity of the law or operations of nature—that is to say—whatever has once happened will, under absolutely similar circumstances, always happen again.

The inductive idea itself,[3] in its elementary form of expression, is simply this: when a limited number of particular instances have been accurately examined by means of observation and experiment, the mind infers,[1] from the uniformity of natural law, on the ground of analogy, that all instances of the kind in question are similar to those that have been so examined, and thereby a general truth is gathered from particular facts. Bacon's sagacity had led him to perceive that no existing philosophical system or school had grasped this idea as a fundamental verity that must in reality underlie all true philosophical method, and that 'nature,' as he observes, 'is not to be conquered, except by obeying her.' That human life, to be happy and virtuous, must be regulated in harmony with, and not in opposition to, Nature's teachings. He points out, in a very striking aphorism,[2] that man's powers are entirely limited to his knowledge of nature—'Man, the servant and interpreter of nature, can do and understand so much, and so much only, as he has observed, in fact or in thought, of the order of nature—more than this, he can neither know nor do.' That such knowledge is only to be acquired by a right use of the reasoning faculties, which must proceed from particulars or observations of nature step by step, ascending from propositions of a limited to those of a larger generality, and only draw inferences strictly deducible from facts,[1] or those natural phenomena that, through observation and experience, our senses report to us. The first essential step in any inductive enquiry being, to assemble and classify carefully the whole of the facts thus duly derived; and the second being, rigorously to exclude from such assemblage everything irrelevant or extraneous.[2] He enumerates with singular acumen, under the Latin term idola,[3] a remarkable array of prejudices, misconceptions, fallacies, and illusions, which, arising from certain common weaknesses in human nature, or from the peculiar disposition and circumstances of individuals, or from the current usage of words, or from false systems of philosophy, or erroneous methods of reasoning, beset and bias the undisciplined mind, clouding the pure light of the understanding, and obstructing its perception of truth; and he propounds, with the most concise energy and brevity, a variety of rules and axioms for guiding the intellect, assisting the senses, and protecting the practice, so as to exclude or eliminate the various sources of error, in the observation, or interrogation by experiment (that is, experience artificially modified), of natural appearances, or in drawing deductions therefrom. He declares that the chief end of the philosophy he is expounding is utility, or fruit, as he phrases it, and the improvement of man's earthly condition;[1] understanding by utility no mere narrow, selfish, or material gratification, but everything which, according to the discovered constitution of our nature, we can require for its elevation, development, or dignity; all, in short, that tends to make life more really enjoyable.[2] So that the inductive philosophy may be regarded practically as a method of inference by which the principles of knowledge are united to the principles of conduct, and the truths of science become transformed into a philosophy whose main object is to supply some connecting link between progressive scientific discovery, and the ordinary course of our daily human existence.

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[1] Dr. Whewell 'On the Influence of Science upon Intellectual Education,' a lecture, *Modern Culture*, Macmillan, 1867.

[2] *Nov. Org.*, lib. i. aph. 71. Of the Greeks generally, Bacon cites approvingly the judgment of the Egyptian Priest, 'quod semper pueri essent; neque haberent antiquitatem scientiæ, aut scientiam antiquitatis.' Of the two philosophical chiefs of classical antiquity, Plato and Aristotle, Bacon's opinions were discriminative and decided. Both had, he declared, been instrumental in the corruption of science: 'Naturalis philosophia adhuc sincera non invenitur, sed infecta et corrupta: in Aristotelis schola per logicam; in Platonis schola per theologiam naturalem.' (*Nov. Org.*, i. 96.) Bacon seems to have considered Plato the greater genius of the two; but, between the method of the great idealist of antiquity, and the great realist of modern times, there was a marked diversity. Bacon, from investigation of natural phenomena, seeking to derive a law; Plato, by the abstraction of mental phenomena, to derive an idea. The Baconian method leads to a world of facts, verified as a transcript of the natural world; the Platonic method to a world of ideas, believed to be the original world itself. Bacon opposes the wisdom of words with the knowledge of things; reproaching Aristotle with resolving reality into categories by means of dialectics, Plato with the conversion of reality into forms through the imagination. See the subject ably treated in Dr. Fischer's *Francis Bacon of Verulam, &c.*, Longmans, 1857.

[3] Baden Powell's *Unity of Worlds*, chap. i., 'The Inductive Principle;' and Hallam's *Literature of Europe*, vol. ii. p. 399, 4th ed., 1854.

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[1] This act of the mind appears simple and obvious in literal statement; but it is exactly that step of the intellectual progress wherein are displayed 'invention, sagacity, genius; elements which no art can give' (Whewell's *Philos. of the Inductive Sciences*, 2nd ed., preface); and 'all observation which involves mind involves theory. The facts of sense must be idealised.'—Baden Powell, *The Inductive Principle*.

[2] Bacon's *Nov. Org.*, aph. 1: 'Homo, naturæ minister et interpres, tantum facit et intelligit, quantum, de naturæ ordine, re vel mente observaverit; nec amplius scit aut potest.'

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[1] 'Of the doctrines promulgated by Bacon, none has more completely remained with us as a stable and valuable truth than his declaration that true knowledge is to be obtained from facts by induction.'—Whewell's *Philosophy of the Inductive Sciences*, preface, 2nd ed.

[2] Sir J. Herschel's *Discourse on the Study of Natural Philosophy*, chap. ii., 'On the analysis of phenomena;' chap. vi., 'Of the first stage of Induction.'—Bacon, *Nov. Org.*, lib. i., aph. 19, 22, 24.

[3] *Nov. Org.*, lib. i., aph. 39–44. The precise English definition of idola, εἴδωλα, as used by Bacon, is the subject of critical controversy.—Hallam's *Lit. of Europe*, vol. ii. p. 410, 4th ed., 1854; *Bacon, his Writings and his Philosophy*, by G. L. Craik, vol. ii. p. 158, C. Knight, 1846.

It is observable that Bacon discards from his philosophical system altogether Theology; on the ground, as he states to King James,[3] that if he treats of it, he shall have 'to step out of the bark of human reason and enter into the ship of the Church, which is only able by the Divine compass to rightly direct its course, and it will be as well therefore to keep silence on the subject.' But, in truth, the Baconian or inductive method is entirely opposite to the theological, or deductive, method. Induction, resting on an appeal to nature, subordinates ancient principles to modern experience. Deduction, being an appeal to authority,[1] begins, not with experience, but with principles regarded as inscrutable. The deductive reasoner therein assuming the very preliminaries which the inductive enquirer would investigate; he suspecting that theological premises are probably the result of the inductions of ancient times, and that such inductions periodically need revising in the light of advancing science.[2]

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[1] *De Dig. et Aug.*, lib. vii., chap. i.; *Nov. Org.*, lib. i., aph. 81.

[2] See the full meaning of 'utility' explained in J. S. Mill's *Utilitarianism*, Parker & Son, 1863.

[3] *De Dig. et Aug.*, lib. ix., 'ad regem suum,' cap. i.; and *Nov. Org.*, lib. i., aph. 65: 'At corruptio Philosophiæ ex superstitione et theologia admista. . . . . plurimum mali infert. . . . Pessima enim res est errorum apotheosis.'

Such, within the limits my lecture allows me, is a brief outline of the essential principles of the inductive philosophy, as expounded by Lord Bacon. From Bacon's time its influence has spread with a rapidity commensurate with the progress of scientific discovery, producing, amongst other notable examples of inductive investigation, Locke's Essay concerning Human Understanding,[3] Malthus's Essay on the Principle of Population, and Sir John Herschel's Discourse[4] on the Study of

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[1] 'The abjuration of human authority is the first principle of Lord Bacon's Philosophy.'—Hallam's *Lit. of Europe*, vol. ii. p. 408.

[2] 'One highly distinctive characteristic of the modern inductive philosophy is the principle of unlimited freedom of enquiry, and the rejection of the trammels of authority.'—Baden Powell's *Order of Nature*, Essay I., sec. 2.

[3] 'We may take leave to suggest that the most valuable part of Locke's *Psychology*, that which has been a lasting addition to knowledge, really was the result of the employment of the inductive method.'—Dr. Maudsley's *Physiology and Pathology of the Mind*, chap. i. p 25.

[4] Lardner's *Cyclopædia*, Longmans, 1831. 'Herschel has con-

Natural Philosophy. But the wonderful works in which Bacon so eloquently displayed its principles remained, for unrivalled perfection in their own department of thought, almost a solitary monument, until the appearance of a writer—an eminent Frenchman, but recently deceased—to whose philosophy I now proceed to invite your attention.

It may possibly strike some of you as a notion altogether novel, to couple the name of Comte with that of Bacon. At any rate, before I attempt to point out how Comte, designing to build on the foundations which the sagacity of Bacon had laid, has, of all subsequent philosophers, been the one who has most considerably extended and verified the application of the inductive method, I will, to obviate misconception, beg of you to understand that I refer to Comte only as an inductive philosopher, and that by reciting some, I am not to be considered as endorsing the whole, of his opinions. From much that he has written, especially in his later works,[1] I, indeed, entirely dissent; and I

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tributed to "Lardner" a discourse on Natural Philosophy, the finest work of philosophical genius in our age, or perhaps (as I exclude the sciences) the finest since Bacon, who, though the greatest of philosophers, has properly no science. I firmly believe no other man in Europe could have written Herschel's discourse.'—Sir J. Mackintosh. See his *Life*, Moxon, 1835, vol. ii. p. 480.

[1] The later works of Comte are distinguished from his principal work by the difference of their method. Comte abandoned the objective method upon which his earlier works are founded, and adopted the subjective method. This change of method is severely, but not, I think, unjustly criticised by E. Littré. He states correctly that 'Dans la méthode subjective le point de départ est une conception de l'esprit, qui pose, *a priori*, comme on dit, un certain principe métaphysique d'où il déduit.' The objective method is

must be permitted to say, I cannot help thinking that the zeal of his disciples, since their master's death, has led them to impart a prominence to such later and unscientific views, which Comte himself, were he living and of sound mind, (we know that unhappily he was not always sane,) would probably be the first to deplore and repudiate. It is, however, to Comte's masterpiece in the French language that I am about to refer, and to which he gave the title 'Philosophie positive;[1] a title which has not hitherto, that I am aware of, been adequately translated into English,[2] an omission much to be lamented, for it can hardly be doubted that if the work itself had been introduced to English thought in a manner intelligible and attractive to average Englishmen, a real knowledge of Comte's Philosophy would be far more widely diffused than it is, and the facility for misrepresenting it proportionately diminished. I believe I am accurate in remarking that, speaking critically, we have no such phrase in the English

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quite different; there, 'le point de départ est un résultat d'expérience.'—*Auguste Comte, &c.*, par E. Littré, p. 532.

[1] *Cours de Philosophie positive*, par Auguste Comte, troisième éd. Paris, 1869, 6 vols.

[2] This remark applies to the title only. The work itself has been very ably translated, and judiciously condensed and abridged in the process, by Harriet Martineau, 2 vols., Chapman, 1853. This translation has been highly praised by Comte himself, *Lettres à Miss Henriette Martineau. Auguste Comte, &c.*, par E. Littré, chap. xiii., Paris, 1864; by A. S. Farrar, in his *Critical History of Free Thought*, Murray, 1862; and is used by Dr. Maudsley in his able work on the *Physiology and Pathology of the Mind*, Macmillan, 1867. My quotations are, for the convenience of English readers, mostly taken from this translation, referring simply to volume and page.

philosophical vocabulary as 'Positive Philosophy,' unless it may be thought to have been very recently naturalised; and no ordinary Englishman, I think, for the first time hearing such a phrase, would be likely even to guess at its meaning; and yet the meaning of Comte, when we look into the work itself, is transparently clear, for there we find that his philosophy is, in substance and spirit, precisely the development of the true inductive idea, viz., the invariability of natural law, analysed up to its first principles, and extended in its application to every subject, including society and morals, of which the human reason can take cognizance. He there states himself that the founders of the philosophy he is expounding were especially Lord Bacon, Galileo, and Descartes, each of whom, he observes, was aware of its true character, understood its conditions, and foresaw its final supremacy;[1] and there can scarcely be a question that Comte's Philosophy, as much as, not to say even more than, Lord Bacon's, would be more accurately designated to English ears by our well-understood term 'Inductive Philosophy,' or by some clear equivalent.[2]

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[1] 'Bacon, Galilée, et Descartes, que la plus lointaine postérité proclamera toujours les premiers fondateurs immédiats de la philosophie positive; puisque chacun d'eux en a déjà dignement senti le vrai caractère, suffisamment compris les conditions nécessaires, et convenablement prévu l'ascendant final.'—*Comte*, Leçon 57.

[2] The fundamental agreement between Bacon and Comte results in reality from the identity of their method, known amongst English thinkers as the inductive or objective method. In Germany 'realistic' is the term by which it is usually distinguished. (See Dr. Fischer's *Realistic Philosophy and its Age.*) The objective method seeks truth in the relation of objects. The subjective

It is to this work exclusively that my subsequent criticism on Comte is intended to apply. A work, indeed, which, under whatever title, and with all its defects, redundances, and errors, is regarded by nearly all who have studied it as one of the noblest contributions to the science of human progress that has ever emanated from a single pen.

The chief particulars in which, in this able treatise, the Inductive Philosophy has been verified and expanded on Lord Bacon's principles, may be briefly summarised as follows. Comte commences[1] what I may term his argument by pointing out, with remarkable originality, that the greater part of all our real knowledge, both in the progress of its own growth, as well as in its contact with the human mind, appears to pass through three distinct stages, corresponding with the divisions to which I alluded at the commencement of my discourse—viz., the theological, or supernatural, its earliest stage; the metaphysical, or abstract, its transition stage; and the scientific, or natural, its final stage; and that the human mind also

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method seeks it in the relation of ideas. The weakness of the subjective method is its impossibility of applying verification; whereas the security of the objective method lies in its vigilant verification. According to the objective method, the successive steps of discovery being observation, hypothesis, verification, that is, confrontation with the facts of nature through sensual perception. See G. H. Lewes's *Hist. of Philosophy*, 'The Objective and Subjective Methods,' vol. i. prolegom.

[1] *Première Leçon.*—The general view of Comte's philosophy given in the text is, of course, very slight and cursory. It is condensed from a consideration of the whole of his treatise, and hardly admits of precise reference to particular portions.

passes from initial theological conceptions to final inductive conceptions, through the transition of metaphysical conceptions; he declaring that all men, up to their age, can verify this for themselves; that each of us is aware, if he looks back upon his own history, that he was a theologian in his childhood, a metaphysician in his youth, and a natural philosopher in his manhood.[1] Comte then proceeds to show, that the sciences, that is, those aggregates of methodised knowledge which have been gradually consolidated from the now long-continued exercise of man's intellectual powers in the observation, interrogation, and interpretation of Nature, and constituted of facts, the truth of which may be verified either by an appeal to experience or a resort to experiment, and being vastly more numerous and extensive than in Lord Bacon's time, when studied and co-ordinated in the order in which Comte has classified and explained them, a serial objective order, corresponding to the progressive complexity of their relative phenomena—viz., Mathematics, Astronomy, Physics, Chemistry, Physiology, and, lastly, Social and Moral Science—do, in their chief methods and most important results, yield an amount of truth, and prove an almost boundless range of phenomena, all governed by natural law, essential to be known and regarded as the foundation of any just theory or true philosophy of human life.[1] He asserts that the fundamental principle of sound philosophy is the subjection of all phenomena to invariable laws; that the general laws of astronomical phenomena are the basis of all our real knowledge; and that, since Newton's time, the development of celestial mechanics had deprived the theological philosophy of its chief intellectual office, by proving that the order maintained throughout our system and the universe is owing to the simple gravitation of its parts.[2] That it is the study, not of man from within, but of the universe, especially through astronomy, that has suggested and developed the great idea of the laws of nature[3] (the root of the Inductive Philosophy), and now capable, he contends, of extension to the whole of phenomena, including those of man and society. He lays down that science, as distinguished from learning, is essentially composed, not of facts, but of laws, and that its true end is to enable us to predict what will certainly happen at a future time; the business of science being to see in order to foresee, so that we may modify the phenomena by which we are affected. Hence his axiom, 'from science, prevision; from prevision, action.' Observing that prevision disproves the notion that phenomena proceed from supernatural will (which, he remarks, is the same thing as calling them variable), and that our ability to modify them proves that the powers under which they proceed are subordinated to our own.[4] He remarks that the proof which Franklin afforded of human control over the lightning, destroyed the theological terror of thunder as effectually as the superstition about comets was destroyed by the prevision of their return, and that, indeed, this rational prevision of phenomena, combined with the modification of them which science enables man to exercise, shows unquestionably that the events of this world are not ruled by supernatural will, but by natural law.[1]

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[1] 'Or, chacun de nous, en contemplant sa propre histoire, ne se souvient-il pas qu'il a été successivement, quant à ses notions les plus importantes, théologien dans son enfance, métaphysicien dans sa jeunesse, et physicien dans sa virilité? Cette vérification est facile aujourd'hui pour tous les hommes au niveau de leur siècle.'—Comte, *Première Leçon.*

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[1] *Comte*, vol. ii. p. 165. [2] Ibid. vol. i. p. 143. [3] Ibid. p. 346.
[4] Ibid. p. 233.

It should be stated that Comte's philosophical application of the inductive theory, in order to explain the phenomena of society and morals, is an advance that it was greatly beyond the power of Lord Bacon to effect, in whose time no basis of scientific truth, broad enough for the foundation of such an extension, existed. Beyond the power, but not beyond the conception of Bacon, whose far-reaching mind enabled him to foresee, not the forms only, but the features of sciences which did not yet exist.[2] 'Some,' says Bacon,

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[1] 'Theological philosophy supposes everything to be governed by will, and that phenomena are therefore eminently variable and irregular, at least virtually. The inductive philosophy, on the contrary, conceives of them as subjected to invariable laws, which permit us to predict with absolute precision. The radical incompatibility of these two views is nowhere more marked than in regard to the phenomena of the heavens; since, in that direction, our prevision is proved to be perfect. The punctual arrival of comets and eclipses, with all their train of minute incidents, exactly foretold, long before, by the aid of ascertained laws, must lead the common mind to feel that such events must be free from the control of any will, which could not be will, if it was thus subordinated to our astronomical decisions.' —*Comte*, vol. i. p. 175.

[2] 'Such were the speculations of Bacon. The power and compass of a mind which could trace, not merely the outline, but the most minute ramifications, of sciences which did not yet exist, must be an object of admiration to all succeeding ages.'—Professor Playfair's *Fourth Dissertation to Encyclopædia Britannica*, 8th ed.

'may doubt whether we propose to apply our method of investigation to natural philosophy only, or to other sciences, such as ethics and politics. We answer that we mean it to be so applied. Our logic, which proceeds by induction, embraces everything.'[1] Comte appeals, for the verification of such extended views, to recent scientific discoveries, and to the facts of modern history, a critical review of which occupies a considerable portion of his treatise.[2]

The progressive growth of the sciences in Comte's (that is our) time, the range of their discoveries, their number and variety, do, indeed, furnish proofs of the universality and uniformity of the laws of nature in countless profusion and overwhelming force.[3] Limiting our attention to two only of the sciences, as being those which, by reason of the sublimity of their phenomena, most powerfully move the mind, viz., Astronomy, in respect of immeasurable space; and Geology, with regard to incalculable time, the testimony supplied by these two sciences alone of the universality and constancy of natural law, is of a vastness and grandeur so impressive, as probably to require the utmost reach of the human understanding properly to appreciate it. But, it is alleged, these are physical sciences, they deal only with inorganic matter. Life, at any rate human life, is regulated by the higher moral law; and there are many who, whilst ready to believe that matter is undisturbed by providential interference, refuse to believe that man is equally undisturbed. In the one case they will admit the scientific doctrine of regularity, but in the other they assert the theological doctrine of irregularity. Science, however, speaks with no uncertain sound, and can show, by unanswerable proofs, that the laws which regulate the movements of matter, do equally affect every action and every instant of human existence. Neither the fervent piety of the blameless Hudson, whose manual of devotion was carried next his heart, nor the agonising prayer he must have uttered on the occasion of that fatal slip from the summit of the Matterhorn, nor the guileless innocence of that unconscious child who, with senses locked in slumber, crossed unthinking the open window sill, availed to avert the penalty attached to the violation of the natural but inexorable law of gravitation.[1]

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[1] *Nov. Org.*, lib. i. aph. 127.

[2] 'The fact is every year becoming more broadly manifest, by the successive application of scientific principles to subjects that had been hitherto empirically treated, that the great work of Bacon was not the completion, but, as he foresaw and foretold, only the commencement of his own philosophy; that we are yet only at the threshold of the Palace of Truth, which succeeding generations will range over as their own; a world of scientific enquiry in which, not matter only and its properties, but far more rich and complex relations of life and thought, of passion and motive, of interest and action, will come to be regarded as its legitimate objects.'—Sir J. Herschel's *Address to the British Association.*

[3] See *Vestiges of the Natural Hist. of Creation*, Proofs, Illustrations, Authorities, &c., 10th ed. Professor Sedgwick's *Discourse on the Studies of the University of Cambridge. The Reign of Law*, by the Duke of Argyll. Herbert Spencer's *First Principles.* Note F, p. 60.

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[1] 'The most unfeeling thing I know of is the law of gravitation; it breaks the neck of the best and most amiable person without scruple if he forgets for a single moment to give heed to it.'—J. S. Mill's *Inaugural Address at St. Andrew's University*, Longmans, 1867.

Doubtless, however, notwithstanding the wide range of phenomena now shown by science to be subject to the action of invariable law, there are a considerable number of social and moral facts, the causes of which cannot be proved to be within that category, and there are many able and estimable minds which not only deny that they are, but cannot conceive that they ever will be proved to be so regulated. Hence it is disputed whether Comte has really done more, with respect to such social and moral phenomena, than point out, by means of analogy (the spirit of induction) and hypothesis (that primary resource of genius), and a review of history from the inductive stand-point, that is, as a chain of causes and effects, that the balance of probability is in favour of his extended views. As, however, it is the faith of the inductive philosopher, that in the moral world, as in the physical, there can be nothing anomalous, nothing unnatural, nothing mysterious, but that all is order, symmetry, and law; he looks forward with confidence to the time when the most irregular and apparently inexplicable occurrences will be explained, brought within the scope of scientific treatment, and under the domain of law. Even now, no one competent to the task could conceive the compilation of a complete code of morals[1] that should ignore physiology, an inductive science; or contend that vice and virtue have no connection with health, health being a subject confessedly dependent on the observance of natural law; the theological theory of disease becoming gradually stamped out by statistics, the grand inductive weapon of sanitary science.

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[1] Note G, p. 61.

I am reluctant to close my observations on the Inductive Philosophy without presenting to your notice some concrete example of it, and I will therefore mention one that the late historian Hallam[1] was accustomed to consider as comprising an almost perfect instance of the Inductive Method, viz., the 'Essay on the Principle of Population,' by Malthus;[2] whose arguments were pronounced by Archbishop Whately to be as unanswerable as the Elements of Euclid. Malthus, by means of investigations into the condition of every known inhabited country, established inductively two propositions. One, that the natural law of animal increase applied to and regulated the production of human beings. The other, that there is everywhere a tendency in population to exceed the limits of subsistence; whence he drew this indisputable deduction: That unless people, by prudence, forethought, and self-restraint, deferred entering upon the marriage state until they had before them the prospect of maintaining a family, more children must inevitably be born than the condition of the country could support. Oppressed as he felt by the appalling fact, which still oppresses us; that of the children that are brought into existence not one half ever live to arrive at manhood;[1] well might the benevolent Malthus exclaim, 'I am not an enemy to population; I am an enemy to vice and misery; and the reason why I desire that no more children should be born than the condition of the country can support is this, that of those that are born the greatest possible number may live.'[2]

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[1] Hallam's *Literature of Europe*, part 3, chap. iii. sec. 2.—'On the Philosophy of Lord Bacon,' 4th ed., Murray, 1854.

[2] *An Essay on the Principle of Population; or, a View of its Past and Present Effects on Human Happiness, &c.*, by the Rev. T. R. Malthus, A.M., F.R.S., &c. 6th edition. Murray, 1826.

Dr. Paley's Works, a Lecture by Richard Whately, D.D., Archbishop of Dublin. Parker and Son, 1859. 'And even now persons may be found among what are called "the educated classes," who decry that eminent and most valuable writer (Malthus). They do not indeed disprove his facts, or answer his arguments. In truth, one might as well talk of answering Euclid.'—Note H, p. 62.

In concluding our review of the Inductive Philosophy, as we find it expounded in the works of Lord Bacon and Comte, the mind is naturally inclined to contemplate some parallel between such remarkable men, who seem to have been gifted with considerable similarity of genius, however much the striking diversity of their styles prevent this being obvious.

The student of Lord Bacon has ever found himself fascinated by the stately eloquence of his style. It is indeed distinguished by such a weight of words, and depth of thought, so combined with dignity and gravity, a splendour of imagery, and an authority of expression, as to make it, so to say, the very majesty of speech. This is indeed in striking contrast with the style of Comte; whose conscientious care to clothe his thoughts in the clearest language has impressed his pages with the appearance of painstaking precision, whilst depriving them of the power of reflecting any other image than the fidelity of the philosopher and the integrity of his truth.[1] We miss also from Comte's pages that incessant play of wit, luxuriance of fancy, and brilliancy of illustration, with which the genius of Bacon has succeeded in adorning the rugged ascent of scientific research, and which are to the striving student as is the glittering profusion of many-coloured flowers, that so continually greet the gaze and refresh the toiling traveller as he climbs the Alpine heights. Bacon had received no special mathematical training, although, like his in this respect more accomplished successor,[2] he clearly saw and expressly asserted that

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[1] 'Thirty per cent. at least die under ten years of age!'—Adam Smith's *Wealth of Nations*, edited by M'Culloch, 1846, note 4, on Population; and the authorities there cited. On the physical causes of premature deaths, see Dr. Southwood Smith's *Philosophy of Health*, chap. iii., and Edwin Chadwick's Reports, cited in Combe's *Science and Religion*.'—Note I.

'The wholesale slaughter of children in our civilised country is truly appalling. Out of 233,515 deaths at all ages, 94,804, or 40·60 per cent., were those of children under five years of age.'—Dr. Elizabeth Blackwell's *Religion of Health*, 1871.

[2] Malthus, book iv. chap. xiii.; and App. vol. ii. p. 444.

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[1] Comte's work is in the form of lectures, the delivery of which was spread over many years, 1830–1842, and this extension necessitated an amount of recapitulation very injurious to its philosophical aspect. 'M. Comte's style is singular. It is at the same time rich and diffuse. Every sentence is full fraught with meaning; yet it is overloaded with words. His scrupulous honesty leads him to guard his enunciation with epithets so constantly repeated that, though to his own mind they are necessary in each individual instance, they become wearisome, especially towards the end of his work, and lose their effect by constant repetition.'—Miss Martineau's *Preface to Comte's Work.*

[2] Comte was a consummate mathematician, and had the highest possible opinion of the utility of mathematics in their applied relations ('this immense and admirable science,' as he terms them); applauding highly the title of Newton's great work, '*Philosophiæ Naturalis Principia Mathematica*,' as indicating with energetic conciseness that the general laws of astronomical phenomena are the basis of all our real knowledge.—Comte, vol. i. p. 142.

Mathematics was the true handmaid of Natural Philosophy, 'the mother of the Sciences.' Comte had also the advantage of living long subsequently, being thereby so much the nearer to Truth, according to Bacon's quaint adage, that 'Truth was the daughter of Time, and not of authority,'[1] and when the accumulated amount of then existing scientific knowledge, systematised as it was by Comte's own powerful mind, lent an aid to his speculations that Bacon had to do without. Both these eminent men were endowed with the faculty of imagination in superlative measure, enabling them, with apparent ease, by means of true hypotheses and real analogies, to grasp after and attain a reach of knowledge that to ordinary minds seems truly marvellous.[2] Both insisted that the great end of Philosophy was to furnish a practical rule and guidance to man

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Applied mathematics is not simply the measurement of extension and number. It is the measurement, by means of extension and number, of other quantities, which extension and number are marks of, and the ascertainment, by means of quantities of all sorts, of those qualities of things which quantities are marks of. The application of Algebra to Geometry (discovered by Descartes) made the first step in applied mathematics; the second was their application to Mechanics, that is, to the general laws and theory of force in the abstract. As the laws of number underlie the laws of extension (both underlying the laws of force), so do the laws of force underlie all the other laws of the material universe.—*Mill on Hamilton, ubi supra.*

[1] 'Recte enim Veritas Temporis filia dicitur, non auctoritatis.'—*Nov. Org.* lib. i. aph. 84.

[2] Yet in each the imagination was duly subordinated to the understanding or reasoning faculty. 'Bounded and conditioned by cooperant Reason, imagination becomes the mightiest instrument of the physical discoverer.'—Professor Tyndall *On the Scientific Use of the Imagination.* Longmans, 1870.

in his career on earth,[1] and both were alike imbued with that over-mastering desire to be of service to their fellow-creatures which the inborn benevolence of true genius has almost invariably displayed.[2] They were also alike conspicuous for the extraordinary range and compass of their intellectual vision, and each, in his own way, took a profound and masterly survey of the entire field of knowledge,[3] and noted its deficiencies. Both conceived that the miseries of life chiefly resulted from human ignorance, or, as we might, in the fashion of the hour, now perhaps call it, 'Intellectual Destitution,' and both set themselves to the arduous task of pointing out in what such ignorance mainly consisted, and how it might be effectually removed; they believing, that in making men wiser, you are making them better. They did not separate the enlargement of reason from the growth of virtue. 'Knowledge,' observes Bacon, 'is not only Power, it is Truth. Nor is there in the whole universe of nature so intimate a sympathy as that between Truth and Goodness, which only differ, as the seal differs from its impression.'[4]

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[1] 'Meta autem scientiarum vera et legitima non alia est quam ut dotetur vita humana novis inventis et copiis.'—*Nov. Org.*, lib. i. aph. 81.

[2] *De Dig. et Aug.* lib. vii. cap. i.

[3] The remarkable view given by Bacon in the *Advancement of Learning* and *De Dig. et Aug. Scient.*, is well known. Comte's survey of the sciences, occupying the first three volumes of his great work, is yet more astonishing for extent of knowledge and grasp of mind. Every division of knowledge and classification of science can be objected to. Bacon's has not escaped censure, and Comte's analysis has been acutely criticised by Herbert Spencer. See his *Classification of the Sciences*, 2nd edition, Williams and Norgate, 1869.

[4] *De Dig. et Aug.*, lib. i. cap. i.; and *Advancement of Learning*, book i. 'For truth prints goodness.'

Both considered Science, or the knowledge and explanation of Nature, to be the grand organon or machinery by which ignorance was to be dispelled; Bacon, with prophetic foresight, exhorting our universities, instead of imagining that by the labours of the ancients everything had been attained, to set their whole might towards the advancement of the sciences, and to leave off attacking each other, in order to unite their forces against the strongholds of nature;[1] and both arrived at the belief that the theological theory of life (as regards God's secular providence, or the method of the Divine Government on Earth) was *not* the true theory: Bacon warning his disciples 'Fidei dentur tantum quæ fidei sunt,'[2] that they should give to Faith the things only that are Faith's; and Comte declaring that the rational progress of theological conceptions consists in the perpetual diminution of their intensity,[3] and that the development of the Inductive Philosophy must eventually emancipate the human mind altogether from theological guardianship.[4] Both,

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'Goodness is seen with the eye of the understanding, and the light of that eye is reason.'—Hooker, *Eccles. Pol.*, book i. chap. vii. sec. 2.

'Knowledge must precede Virtue, for no chance act can be a moral one. Vice is always the companion of ignorance, rarely of knowledge, never of wisdom.'—Mackay's *Progress of the Intellect*, vol. i. p. 70.

[1] See the remarkable letters of Lord Bacon to the Universities of Oxford and Cambridge.—*Bacon's Works*, 2 vols. 1837, Ball. Vol. ii. *Epistolæ*, p. 751.

[2] 'Itaque salutare admodum est, si mente sobria fidei tantum dentur quæ fidei sunt.'—*Nov. Org.*, lib. i. aph. 65.

[3] *Comte*, vol i. p. 310.

[4] *Ibid.*, vol. ii. p. 315.

too, considered it a part at least of man's highest duty, to find out and study the laws of Nature, and to endeavour to regulate his life in accordance with their dictates; for they were alike animated with the same heroic confidence in Nature, and intense love of reality, and both had the firm unalterable conviction that human happiness, and not suffering, was the great object of Nature's arrangements, and that the Intellect, that noblest of God's gifts to man,[1] armed with proper instruments, and disciplined by appropriate culture, was sufficient in itself to enable man to arrive at an adequate knowledge of them.[2] Lastly, it is noticeable that these profound and comprehensive thinkers agreed in rejecting the study or investigation of causes first and final, (regarding it as a theological invasion of scientific rights; for, in Bacon's witty conceit, 'like a virgin consecrated to God, it bears nothing,'[3])—in confining research to the invariable relations which constitute Natural Laws, and in limiting the range of their philosophical theories by the axioms, that observed facts are the only basis of sound speculation; and that no proposition that is not finally reducible to the enunciation of a fact, particular or general, can offer any real and intelligible meaning.[1]

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[1] 'Do what we will, the highest efforts of human thought can conceive nothing higher than the supremacy of Intellect.'—Mackay, *Progress of the Intellect, &c.*, p. 113. 'We have learned at last to recognise that the intellect is a divine gift.'—Miss Cobbe's *Preface to the Works of Theodore Parker.* Trübner, 1863.

[2] *Nov. Org.*, lib. i.; and *Instauratio Magna, Distributio Operis, passim.* 'Those prodigious resources of the human understanding, which are often despised by men who are ignorant of them; but which in reality are so great that no one has yet arisen able to scan them in the whole of their gigantic dimensions.'—Buckle, *Hist. of Civil.*, vol. i. p. 729.

[3] 'Nam causarum finalium inquisitio sterilis est, et, tanquam virgo Deo consecrata, nihil parit.'—*De Dig. et Aug.*, lib. iii. cap. v.; *Comte*, vol. ii. pp. 351, 511.

It remains to be remarked of these illustrious men, that they were proficients in Philosophy, rather than in Science, and, more eminently, Philosophy of human than of general nature; and, if it be the case, as an eminent professor has lately sought to show,[2] that Comte possessed but slight actual acquaintance with scientific processes, it must be admitted that Bacon probably had less. Harvey, who was the Huxley of Lord Bacon's day, said of Bacon sneeringly, that he wrote of Science 'like a Lord Chancellor.'[3] But, though their Science be sneered at, or their Philosophy sought to be refuted, they cannot be deprived of their splendour of genius, their elevation of view, and their devotion to the highest moral law of Science—love of the Spirit of

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[1] Comte, vol. ii. p. 511. It has been suggested that this feature of the Inductive Philosophy is at present exercising a decidedly prejudicial influence on the English intellect, by producing an excessive distaste for the higher generalisations, and for all speculations that do not lead directly to practical results.—Lecky's *Rationalism*, vol. i. p. 443. But Mr. Mill has justly remarked, that such tendency is the effect of an exclusive following of what is imagined to be the teaching of Bacon, being in reality the result of a slovenly conception of him, leaving on one side the whole spirit and scope of his speculations.—Mill on *Hamilton*, p. 541, *note.*

[2] Huxley, *Lay Sermons*, &c., 'Scientific Aspects of Positivism.' Macmillan & Co., 1870.

[3] Nothing more is meant by this juxtaposition of the names of Harvey and Huxley than that they are alike in the relation in which they stand towards the objects of their censure—viz., men of special science criticising philosophers. Harvey was a great discoverer as well as a profound physiologist.

Truth, wherewith in 'thoughts that burn and words that breathe' they have inspired so many kindred minds to think deeply upon social problems, and to strive nobly for social regeneration. Their works indeed 'have moved the intellects that have moved the world.'[1]

If the Inductive Philosophy be such as I have endeavoured to describe it, how is it, you may ask, that we sometimes hear of grave objections being urged against it? I need hardly remind you of the proverb which tells us what usually happens when you give a dog a bad name. It has been objected, then, to the Inductive Philosophy, disguised in the garb of Positivism,[2] that it leaves out the spiritual part of man's nature—an objection which is about as rational as it would be to say the multiplication table should not be taught because you would not thereby learn the Apostles' Creed. The true answer to the objection, however, is this. The spiritual part of man's nature is at present the subject, not of Science, but of Theology; and the Inductive Philosophy, however much it may seek to recover from Theology domains that do not belong to her, does not assume to supersede Theology in her own proper sphere.[3] But the Inductive Philosophy has also, thus disguised, been denounced as a system of materialism, whatever that may mean. Science no doubt is limited to matter, its laws, and its relations,[1] and the Inductive Philosophy, being founded on Science, is, necessarily, so far material. But, whilst man himself is a being compounded partly, at any rate, of matter, living in a world of matter, surrounded by, and subjected on all sides to material influences, can it be wise for any man, or set of men, whatever their piety, to seek to disparage a system of knowledge which aims at expounding for man's benefit the properties and laws of matter, the nature of material influences, and the relations in which man, in this world, has been placed towards them? Can there be a doubt, for instance, that it must be of the greatest importance for man to have ascertained, from the teachings of Science, that he cannot destroy one particle of matter, or one moment of force; but that he can, as the Inductive Philosophy teaches, so arrange matter, that force shall be his servant?[2] Nay, will any one seriously deny that the true satisfactions of life, its duties and its charity, its happiness and its virtue, are now in course of being diffused throughout the civilised world, as one result of Science having, in a Franklin, enabled man to grasp the lightning, and Inductive Philosophy, in an Oersted,[3] a Faraday, and a

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[1] 'The conviction which the study of M. Comte's works left on my mind, which I shall always be thankful to him for awakening in me; that the organisation of society upon a new and purely scientific basis is not only practicable, but is the only political object much worth fighting for.'—*Huxley, ubi supra.*

[2] See *passim, The Limits of Philosophical Enquiry*, by William, Lord Archbishop of York. Edinburgh: Edmonston & Douglas, 2nd ed. 1868; and *Positivism, a Lecture* (Christian Evidence Society), by Rev. W. Jackson, M.A., F.S.A., &c. Hodder and Stoughton, 1871.

[3] Faraday, *On the Education of the Judgment*, a Lecture—Modern Culture. Macmillan, 1867.

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[1] 'Au-delà de ces deux termes, matière et force, la science positive ne connaît rien.'—Comte, *Préface d'un Disciple* (E. Littré).

[2] On the conservation of force, the indestructibility of matter, and the invariability of gravity, see Faraday's brilliant *Discourse on the Conservation of Force*. London, 1857.

[3] Note J, p. 71.

Wheatstone, having taught man how to apply the lightning to his use?—whereby time and space are annihilated, in order to bind all mankind into one family, for their intellectual and moral advancement; and the thunderbolt snatched from heaven, passed through the depths of the ocean, becomes a messenger of love to the most distant nations.[1]

Such are the fruits of the Inductive Philosophy, or Philosophy founded on Science,[2] that is, on the knowledge of universal invariable Law; the sacred code, promulgated by the great Legislator of the Universe for the guidance of his creatures to happiness—that Law of which our eloquent Hooker so sublimely speaks when he assures us, 'there can be no less acknowledged than that her seat is the bosom of God, her voice the harmony of the world; all things in heaven and earth do her homage; the very least as feeling her care, and the greatest as not exempted from her power—both Angels and men, and creatures of what condition soever, though each in different sort and manner, yet all, with uniform consent, admiring her as the mother of their peace and joy.'[3] To whom, therefore, the inspired poet addressed the rapt utterance, 'Bless ye the Lord; praise Him, and magnify Him for ever.'

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[1] '"Eripuit fulmen Cœlo," is part of the inscription on a medal struck in honour of Franklin.'—Mary Somerville's *Connexion of the Physical Sciences*, sec. xxxii. p. 327, 9th ed. Murray, 1858.

[2] Note K, p. 71, and note L, p. 74.

[3] Hooker's *Ecclesiastical Polity*, book i. *ad finem.*

NOTES.

NOTE A, p. 1.

The Telescope and its Discoveries.

The telescope was invented early in the seventeenth century, probably by James Metius, of Alkmaer, in Holland, in the year 1609. Galileo, from hints that he picked up in Venice in the same year, constructed the first practical astronomical telescope; and it is related that he was besieged from morning till night by crowds of the inhabitants, all eager to have a peep through the wonderful glass, which he subsequently presented to the Doge, who accepted it from him sitting in full council.

The first effects of the discoveries that followed the invention of the telescope upon the prevailing orthodox cosmical theories were simply astounding, and exercised such a withering influence upon the ancient philosophy,[1] that many of its adherents, in the height of their mortification, took refuge in absolute incredulity, and with absurd pertinacity refused to assure themselves by actual inspection of the reality of the phenomena thus revealed for the first time to mortal eyes. 'Oh, my dear Kepler,' says Galileo, in one of his letters to that astronomer, 'how I wish that we could have one hearty laugh together! Here at Padua is the principal Professor of Philosophy, whom I have repeatedly and earnestly requested to look at the moon and planets through my glass, pertinaciously refusing to do so. Why are you not here? What shouts of laughter we should have at this glorious folly, and to hear the Professor of Philosophy at Padua labouring before the Grand Duke with logical arguments, as with magical incantations, to charm the new planets out of the sky.'[1]

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[1] The interest this discovery excited was intense, and men were so little habituated to accommodate their convictions on matters of science to newly observed facts, that several of the 'paper philosophers,' as Galileo termed them, appear to have thought they could get rid of these new objects by writing books against them. The effect which the discovery had upon the reception of the Copernican System was immediately very considerable. It showed that the real universe was very different from that which the ancient philosophers had imagined.—Whewell, *Hist. of the Inductive Sciences*, vol. i. p. 414.

Kepler himself, speaking in extravagant ecstasy of his celebrated work, 'Harmonice Mundi' (in which he details the discovery of his third law of the planetary motions), says, 'To be read now, or by posterity, I care not which; it may well wait a century for a reader, since God has waited six thousand years for an observer.[2]

Kepler was a most remarkable character; among the last of the old astrologers and the first of the great astronomers. As a discoverer he is only excelled by Sir Isaac Newton. He discovered three great laws which, extended from the case of Mars (the planet he chose for study) to that of all the other planets in our system, constitute the foundation of celestial mechanics. The first law regulates the velocity; the second determines the figure of the orbit; the third establishes harmony among all the planetary motions. Since Kepler's time the discovered number of bodies in our system has more than trebled, and all have in turn verified these laws.[3]

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[1] Grant's *Hist. of Physical Astronomy*, p. 521.

[2] Kepler, *Gallery of Portraits and Memoirs*, vol. iii. Charles Knight, 1834.

[3] See these laws explained in Whewell's *Hist. of the Inductive Sciences*, vol. i. p. 482, 'Inductive Epoch of Kepler;' and in Herschel's *Astronomy*, (485)–(492).

NOTE B.

The Christian Fathers—The Inquisition—Religious Persecution.

Intellectual history nowhere records a more remarkable revolution than the change of opinion that has occurred concerning the authority of the Fathers. Occasionally, indeed, even now, some mind of mediæval mould may be seen exhibiting the zeal or indiscretion of its piety by a flutter, so fervid or fantastic, of these antiquated ecclesiastical scarecrows, as to give them a semblance of life in the eyes of the unsophisticated vulgar; but in England the general judgment of the public has long since been pronounced against them, and is nowhere perhaps more leniently expressed than in the *Edinburgh Review* for November 1814, which says (in allusion to such an exploit as is above referred to), 'We had thought that the merits of the Fathers were beginning to be pretty fairly estimated. . . . . That the time of their authority over conscience and opinion was gone by; that they were no longer to be regarded as guides either in faith or in morals; and that we should be quite within the pale of orthodoxy in saying that, though admirable martyrs and saints, they were, after all, but indifferent Christians.'

A philosophical historian, whose rare range of erudition, investigating intellect, and uncompromising veracity impart to his opinions peculiar power, has not hesitated to declare that 'the lives and writings of the Saints and Fathers are, on the whole, the most puerile literature Europe has ever produced.'[1]

We are living in an age when the discoveries and methods of the physical sciences have so marvellously enlightened, disciplined, and strengthened the intellectual faculties as to render it not a little difficult to realise that mental condition of the dark ages, when credulity and superstition were so intense and widespread as to impel even the most intelligent persons to believe thoroughly the fables and forgeries that these once venerated worthies with solemn theological jargon dogmatically asserted to be profound truths, laboriously derived from the ascetic study of inspired writings, or visibly attested by the constant happening of astounding miracles.

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[1] Buckle, *History of Civilisation*, vol. i. p. 730.

If any reader be disposed to doubt the soundness of Buckle's views in this matter he need only turn to Middleton's learned and manly 'Free Enquiry,'[1] peruse carefully its well-considered pages, and consult some half-dozen of the original authorities there cited, and he will not, I think, fail to feel that in point of fact, no force of speech can be too strong to express the derision and contempt in which the lucubrations of the Fathers ought for the most part to be regarded by the intelligence of the present day.

To us, who look back upon the period, it really seems as though the mind of Protestant Europe had been suddenly aroused from some slumber of superstition by the publication of Middleton's book; for, though the opinions of the Fathers were, by the progress of enlightenment, becoming more and more a difficulty with theologians—who were reproached by Chillingworth with the duplicity with which in his time the Fathers were treated, 'accounting them Fathers when they are for you, but children when they are against you,'[2]—there was no generally prevailing sentiment of the worthlessness of the various improbabilities, absurdities, and falsities that constitute no small portion of the staple of those celebrated writings—the works of the

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[1] Middleton's great work, 'a book of extraordinary merit,' consists of three portions—the Introductory Discourse, the Enquiry itself, and the Vindication from the objections of Dr. Dodwell and Dr. Church. Middleton's *Works*, vols. i. & ii. London, 1755. 5 vols.

[2] *Calamy's Life*, vol. i. p. 253. London, 1820. 2 vols. Chillingworth's own opinion of the authority of the Fathers is sufficiently clear. 'I see plainly with mine own eyes that there are Popes against Popes, Councils against Councils, some Fathers against others, the same Fathers against themselves, a consent of Fathers of one age against a consent of Fathers of another age, the Church of one age against the Church of another age.'—*Religion of Protestants*, chap. vi. sec. 56.

Fathers; compositions which, viewed collectively, present so melancholy a picture of the wasteful misapplication of mental power.

The Patristic edifice seems to have been only completely shattered by the crushing assault of Middleton.

'Middleton's attack upon the veracity of the Fathers was so eloquent, so uncompromising, and so admirably directed, that all England soon rang with the controversy. He contended that the religious leaders of the fourth and earlier centuries had admitted, eulogised, and habitually acted upon principles that were diametrically opposed, not simply to the aspirations of a transcendent sanctity, but to the dictates of the most common honesty. He showed that they had applauded falsehood, that they had practised the most wholesale forgeries, that they had habitually and grossly falsified history, and that they had adopted to the fullest extent the system of pious frauds, and that they continually employed them to stimulate the devotion of the people.'[1]

Such were the charges which Middleton brought against those great Fathers who had formed the theological system of Europe!

The real knowledge possessed by the two renowned doctors, Lactantius and Augustin, to whose opinions Kepler pointedly refers, may to some extent be gauged by a consideration of their views of the physical discoveries of their day, 'their bigoted rejection of the most obvious truths in natural science.'[2]

The ecclesiastical notion entertained concerning the shape of the earth during the earlier centuries of Christianity described it as an oblong floor, surrounded by upright walls, and covered by a vault.[3] In Augustin (Civ. Dei) it is asserted that there are no inhabitants on the opposite side, because no such race is recorded in Scripture. The existence of antipodes, or persons inhabiting the opposite side of the globe of the earth was indeed a much vexed question. 'Is it possible,' says Lactantius, 'that men can be so absurd as to believe that the crops and the trees on the other side of the earth hang downwards, and that men have their feet higher than their heads?'[1]

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[1] Lecky's *Hist. of Rationalism*, vol. i. p. 168.

[2] *Edinburgh Review*, ubi supra.

[3] *Cosmas Indicopleustes*, 'Topographia Christiana,' or 'Christian Opinion concerning the World.'—Montfaucon, *Collectio Novum Patrum*, book ii. p. 113, cited by Lecky, *ubi supra*, p. 294.

With regard to the philosophical proposition of the earth's motion, it would seem, from the passage quoted from Kepler, that the Inquisition had denounced that idea previously to its formal condemnation of Galileo. Kepler's courageous book ('De Motibus Stellæ Martis') was published in 1609. Galileo was first warned in 1616, and condemned in 1632, when he was made to retract his scientific conclusions, and, in his celebrated recantation, to declare—first, 'the proposition that the sun is the centre of the world and immoveable from its place is absurd, philosophically false, and formally heretical, because it is expressly contrary to Holy Scripture.' Secondly, 'the proposition that the earth is not the centre of the world, nor immoveable, but that it moves, and also with a diurnal motion, is absurd, philosophically false, and, theologically considered, at least erroneous in faith.'[2]

The narrative of the treatment of Galileo by the august and venerable body of the Inquisition can never become trite or commonplace, be too frequently repeated, or too seriously dwelt upon. Like the sentence upon Socrates,[3] it should be preserved as a specimen of persecution through all time. The Inquisitors were amongst the most enlightened ecclesiastics of their age; they were not bad men, they acted conscientiously according to their light, and they certainly contrast very favourably with their theological successors in having acted upon a straightforward and honest interpretation of the language of Scripture. They apparently recoiled from doing (what is now so often done), viz., to quibble and palter with the literal simplicity of the sacred text until it is so depraved as to be made to appear to mean almost anything whatever, that the philosophy or fashion of the hour may seem to require, in order to maintain with the multitude its authority as verbally inspired truth.

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[1] Whewell's *Hist. of the Inductive Sciences*, vol. i. p. 271.

[2] Article 'Galiléi Galiléo,' *Penny Cyclopædia; Life of Galileo, Library of Useful Knowledge.*

[3] 'To hear of so illustrious a man being condemned to death . . . . inspires at the present day a sentiment of indignant reprobation, the force of which I have no desire to enfeeble. The fact stands eternally recorded as one among the thousand misdeeds of intolerance.'—Grote's *History of Greece*, vol. vi. ch. 68. 'Sokratés,' p. 180. Murray, 1862.

In one respect, however, the theological mind and the sacerdotal spirit remain the same. From Galileo to Colenso modern history reveals one long consistent chain of ceaseless effort to suppress 'per fas aut nefas' free intellectual enquiry, to stamp out all truth, but what the audacious presumption of theologians may choose to stereotype as 'the truth,' and, by every means, whether violent or fraudulent, to persecute in body or mind its most fearless, upright, and accomplished exponents.[1]

Priestcraft can no longer, indeed, in our country rekindle the fires of Smithfield, or even induce the grand jury of the county of Middlesex to present an unanswerable book as a common nuisance[2]; but unhappily it is yet permitted so to apply the torture of social stigma as often probably to tear peace of mind from the inmost heart.

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[1] See the estimate of Galileo's character in the masterly memoir above referred to. 'The numberless inventions of his acute industry; the use of the telescope, and the brilliant discoveries to which it led; the patient investigation of the laws of weight and motion, must all be looked upon as forming but a part of his real merits, as merely particular demonstrations of the spirit in which he everywhere withstood the despotism of ignorance, and appealed boldly from traditional opinions to the judgment of reason and common sense. He claimed and bequeathed to us the right of exercising our faculties in examining the beautiful creation which surrounds us.'

[2] Of Toland's *Christianity not Mysterious*, published in 1696, we are told, the grand jury of the county of Middlesex was induced at once to present it as a nuisance, and the example was followed by the grand jury of Dublin. Two years after its publication the Irish Parliament deliberated upon it, and, refusing to hear Toland in defence, passed sentence that the book should be burnt, and its author imprisoned.'—A. S. Farrar's *Critical Hist. of Free Thought*, Lec. iv. p. 179.

See *passim*, 'A Critical History of Free Thought,' &c., by the Rev. Adam Storey Farrar (Bampton Lectures for 1862). This able, candid, and instructive work might well have been entitled 'a history of the persecutions for opinion by the Christian Church in all ages.' It is indeed a most painful record. The author, though speaking from the orthodox point of view, is compelled to admit that the progress of knowledge is the exciting cause of free thought, that the human mind cannot be chained, that new knowledge will suggest new doubts, but that the human mind, struggling to be free, has been kept down by material force and cruelty. That in the long interval of the middle ages the Church was always able to supplement or supersede argument by force, and did, in fact, silence the unbeliever by martyrdom; and that in the long suppression of liberty that followed the political revolutions of 1848 the orthodox movement in theology united itself with the reactionary movement in politics, whereby absolute government was constituted, 'not merely a fact, but a doctrine.' He confesses that those who have been the teachers of the world have too often been its martyrs. 'When, however, the mind of Europe awoke, free thought could no longer be suppressed by force.'—Pp. 147, 251, 293, 399, 511, 512.

Gibbon, in 1776, is enabled to say, in reference to the clerical outcry that greeted the publication of his history of the *Decline and Fall of the Roman Empire*, ch. xv. and xvi.: 'But the shaft was shot, the alarm was sounded, and I could only rejoice that, if the voice of our priests was clamorous and bitter, their hands were disarmed from the powers of persecution.'—*Memoirs of my Life and Writings*; Gibbon's *Decline and Fall*, &c., vol. i. p. 104. Murray, 1854.

NOTE C, p. 7.

The Theological phrase 'Arbitrary Supernatural Will,' and the Scientific term 'Invariable Natural Law.'

It can hardly be too seriously insisted upon, that in attempting to define the attributes or operations of Deity, we are only reducing to language the ideas of our own finite and limited intelligence, upon a subject completely beyond the grasp or comprehension of the human understanding; that our criticisms are really only the discussion of such ideas, and that, 'whilst theologians of the schools have thought they were establishing religious truths by elaborate argumentation, they have been only multiplying and arranging a theological language.'

The mode in which Divine mysteries are attempted to be made intelligible, through the medium of language and logic, was ably animadverted upon by Dr. Hampden in his Bampton Lectures on 'The Scholastic Philosophy considered in its relation to Christian Theology,' whence the foregoing quotation is taken;[1] but it is nowhere more clearly and concisely stated than in the defence of the Rev. Charles Voysey, on the hearing of the charge of heresy preferred against him.[2] He therein observed—'First, you are told that a doctrine is a sublime mystery, which transcends the powers of the human mind. The next step is, to substitute for the mystery a gloss or explanation which is quite intelligible, and as absurd as it is intelligible. Finally, you are told, that because the gloss is equivalent to the mystery, you cannot expose its absurdity, without denying the truth of the mystery.'

The theologian, who conceives it to be his especial province, with presumptuous pen, to parcel out and analyse the attributes of the Great First Cause, as though they were familiar to him as the ingredients of some chemical compound,[1] finds it necessary in the first instance to lower the conception of Deity to the level of humanity, that is, to designate God as a Person;[2] and it seems perfectly plain that in so doing he lays himself open to the imputation that 'man has created God in his own image.'[3] 'The various mental attributes that we' (*the theologians*) 'ascribe to God . . . . can be conceived by us only as existing . . . . in a Person. . . . . It is our duty to think of God as Personal.'[4] It has indeed been said that belief in the existence of a Personal God is essential to all religion,[5] but such an axiom seems to be based on the narrow view of regarding religion as limited to theology.

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[1] Lecture ii.

[2] *Defence of the Rev. Charles Voysey.* Trübner & Co., 1869.

The reader need hardly be reminded that these are not the conclusions of Science. Again, 'personality, as we conceive it, is essentially a limitation and a relation.'[6] But Science knows of no limitation of 'the Inscrutable Power manifested to us through all phenomena, and whose nature transcends intuition and is beyond imagination. . . . . duty requires us' (*men of science*), 'neither to affirm or deny personality; our duty is to submit ourselves with all humility to the established limits of our intelligence.'[7]

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[1] 'If any theologians in the present century had constructed creeds subdividing the Deity into persons, and then deciding upon their relationship, equality, and consubstantiality, the presumption and impropriety of such vain conceits would have offended the whole Protestant world.'—*Christian Theology and Modern Scepticism*, by the Duke of Somerset. Bain, 1872.

[2] Our human personality gives a false modification to all our conceptions of the Infinite.—Theodore Parker, *Discourse on Matters pertaining to Religion.*

[3] Mackay's *Progress of the Intellect as exemplified in the Religious Development of the Greeks and Hebrews.* J. Chapman, 1850. Chap. iii., 'Idea of God metaphysically,' sec. 1.

[4] Mansel's *Limits of Religious Thought*, Lecture iii.

[5] Duke of Argyll's *Reign of Law*, chap. i. p. 57.

[6] Mansel, *ubi supra.*

[7] Herbert Spencer's *First Principles*, chap. v. sec. 31; Sir J. Herschel's *Discourse on the Study of Natural Philosophy*, chap. ii.

The most imperious, and, to the earliest thinkers, mysterious and apparently supernatural, attribute of man, was his Will, and therefore, amongst other qualities, Will was at once transferred to and became an integral portion of the earliest anthropomorphic conception of God;[1] and the interminable discussions that have been thereby occasioned, on that and its cognate and derivative subjects, are well by our great poet depicted—[2]

> Others apart sat . . . .
> In thoughts more elevate, and reason'd high
> Of Providence, foreknowledge, will and fate;
> Fix'd fate, free will, foreknowledge absolute;
> And found no end, in wandering mazes lost.

But Will, in the only intelligible sense, or of which we can have any knowledge, viz. human will, was known to be vengeful, arbitrary, variable, capricious, and capable of being turned or influenced by entreaty. Hence, such by analogy is the theological conception of the Will of God, and hence it came to be popularly believed that the Divine Will could be operated upon by prayer, and hence too it has arisen that those uniformities of co-existence and sequence in everything

Science may perhaps be said to be, in this respect, atheological, but it is not the less religious on that account. Indeed, 'True religion without science is impossible; the dignity, and therefore the truth, of religious beliefs is in direct relation to the knowledge of science, and of the great physical laws by which our universe is governed.'—Sir J. Lubbock, *Origin of Civilization, &c.*, 'The Primitive Condition of Man.' Longmans, 1870.

'Religion ignores its immense debt to Science; and Science is scarcely at all conscious how much Religion owes it. Yet it is demonstrable that every step by which Religion has progressed from its first low conception to the comparatively high one it has now reached, Science has helped it, or rather forced it to take.' . . . . . 'The beliefs which Science has forced upon Religion have been intrinsically more religious than those which they supplanted.'—Herbert Spencer, *First Principles*, pp. 102, 104.

[1] Mackay's *Progress of the Intellect, &c.*, chap. iv., 'Moral Idea of God.'

[2] Milton's *Paradise Lost*, book ii. 557–561.

going on around us, discovered by Science and characteristic of Nature, are sometimes placed by theologians in opposition to the Will of God, simply indeed (however paradoxically) from the very fact that such regularity of action was wholly different from human action—the latter proceeding from variable and uncertain will; and thus has probably arisen the theological phrase 'Arbitrary Supernatural Will,' as expressive of the nature or direct source of the Divine Government.

Science, on the other hand, knows nothing, in a theological sense, of 'Will.' All its discoveries, all it finds traces of, are expressed by the term 'Law,' the sense of which is entirely opposite to that of 'Will.' Law being a term expressive of the uniformity, invariability, and regularity of the constant course of procedure of the phenomena manifesting the Unknowable or First Cause.[1] Science, too, discovers nothing supernatural, everything known to it being clearly within the domain of Nature. Indeed, it has been asserted that 'the supernatural can never be a matter of Science or knowledge, for the moment it is brought within the cognisance of Reason, it ceases to be supernatural.'[2]

To the extent to which reasoning can be intelligibly resorted to, with a view to explain so metaphysical, mysterious, and sublime a subject as the method of the Divine Government on Earth, it seems essential to preserve throughout discussion the distinct meanings of the human ideas 'Will' and 'Law,' which are still but human, however applied in endeavours to define the attributes of Deity. In the Duke of Argyll's 'Reign of Law,' these meanings are (it seems to me) as much as possible confused (rather 'Will' entirely emptied of its distinctive meaning, and Theology thereby altogether ignored); but the Duke's argument may have required, or his main conclusions, possibly, could only be established by means of, such confusion.

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[1] Manifesting to us. A law of nature, after all, being merely a metaphor expressing a generalization of relations made by the human mind.—*Buckle*, vol. i. p. 28, note 32.

[2] *The Order of Nature*, by the Rev. Baden Powell, essay ii. sec. 1. Longmans, 1859.

This distinction in the human mind between 'Will' and 'Law' is not only very real, but is apparently ineradicable, for it is found historically to pervade all philosophical literature, dividing philosophers themselves into two distinct schools, viz. Idealists and Sensationalists (or Realists).[1] All men, observed Coleridge ('Table-Talk'), are born disciples of Plato or Aristotle; that is, their different idiosyncrasies will range them under one or other of these great catholic but opposite thinkers; and neither school seems able, by reason probably of such innate intellectual difference, fully to appreciate the other. Adequately to discuss this remarkable distinction (which can here be barely indicated) would require a volume, and probably no satisfactory or definite result by any amount of discussion could from our present materials be arrived at. An attempt to explain it was made by Dr. Whewell in his Essay on 'The Fundamental Antithesis of Philosophy,'[2] or, the opposition between Ideas and the Senses, between Theory and Fact.[3] His expressions are, I venture to think, too strongly contrasted; he shows, however, that the Idealist is not content to derive his conclusions solely from the facts of sense, but requires something else, which he regards as contributed by the mind itself. The objection of the Sensationalist to admitting the assumption that the mind, *per se*, and wholly irrespective of facts or sensations, can contribute anything, is founded on the total absence of any sort of verification, or external standard, to which appeal can be made in proof of such assumption, or, of that in particular which is asserted to be so contributed. The conclusions of the Idealist, as such, cannot be tested; being pure conceptions that cannot be derived from the senses.[1] They may therefore be untrue; at least they cannot be proved to be true, and therefore ought not to be made the basis of positive belief.

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[1] 'In our common philosophical language, *sensations* and *ideas* represent the two great sources of our knowledge. We have an outward source, *Nature*; and an inward source, *pure ideas*, which terminate on the side of the Will. Sensationalism accordingly is the philosophy built upon the former. Idealism is that built upon the latter.'—*Historical and Critical View of the Speculative Philosophy of Europe in the Nineteenth Century*, by J. D. Morell, A.M. Introduction, p. 67, note i., 2nd ed. Johnstone, 1847.

[2] *Transactions of the Cambridge Philosophical Society*, vol. iii. part 2, No. 14, 1844.

[3] 'The radical antithesis is not between fact and theory, but between verified and unverified inferences.'—G. H. Lewes, *Aristotle*, 'The Metaphysical and Scientific Methods,' p. 74.

It is obvious that Theology, from its very nature, that is, a logical system or exposition of the Nature, Attributes, and Will of Deity, a kind of knowledge hardly derivable from sensible facts, must, so far as it can be treated philosophically at all, follow the method of Idealism. Accordingly it is Plato and not Aristotle who is the great philosophical authority with theologians.[2]

It might appear on first impression, indeed it has been by many supposed, that Idealism affords greater scope to the intellectual faculties than Sensationalism (which has been described by the opposite school as 'cold,' 'low,' 'grovelling,' 'utilitarian,' 'material,' &c.), and enables the mind to discover and grasp truths to which Sensationalism is inadequate to attain; but, on examination, it will be seen that in effect the very reverse is the case. The moment the objective method, that is, the building up of our ideas upon a sensational basis, and verifying them by an appeal to external nature, is departed from, due control over the imaginative faculty would seem to be lost, and intuitions, or the intuitive conclusions of the imaginative and emotional consciousness, are admitted, and by the Idealist accepted, as truths; and it will be found on analysis that it is upon such truths are really erected those theological dogmas and beliefs which have ever been brought to bear to coerce and abase what their advocates term 'the pride of the human intellect,' and which form a system that has sometimes even openly boasted of subjugating the reason of mankind. These alleged truths are, indeed, the foundation of all that goes by the name of 'authority' in the intellectual struggle that is ever proceeding between authority and reason, and they will on close consideration be discovered to form effectual though conventional boundaries to all philosophical enquiry; the fetters by which, until recently, scientific progress has been so hampered, and freedom of intellectual enquiry all but suppressed; although the subject may be so speciously manipulated as to make it appear otherwise, as it very adroitly, however really fallaciously, effected in the Archbishop of York's 'The Limits of Philosophical Enquiry.' (Edmonston and Douglas, 1868.)

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[1] Cudworth's *Eternal and Immutable Morality*, book iv. chap. i. and ii.

[2] 'The piety of Platonism, its abstractedness from the visible world, its elevation of the moral sentiments, recommended it forcibly to the imagination and the feelings of the contemplative theologian. . . . . The expressed partiality of Augustine for the philosophy of Plato, combined with the invectives against Aristotle thrown out from time to time, had established that philosophy, in name at least, as the orthodox system of the Western Church.'—*The Scholastic Philosophy, &c.*, by Dr. Hampden, lect. ii. p. 61.

It is noticeable that the term Theology was at first generally used as synonymous with Divinity, and limited in its meaning to the systematic knowledge of God derived from the study of Revelation,[1] but that with the advance of knowledge its meaning has been extended (especially by Ray, Derham, and Paley), so as to enable it, if possible, to embrace the discoveries of Science under the term 'Natural Theology,' another ambiguous and misleading phrase, causing great confusion of thought even in minds of the most powerful cast, as may be seen on turning to Lord Brougham's preliminary discourse to 'Paley's Natural Theology.' Natural theology, however, as yet only aims at embracing the examination of Nature as supplying 'evidences of the attributes of the Deity,' as Paley expresses it; or, as Lord Bacon says, after calling the phenomena of Nature a volume of the Works of God, and, as it were, another Bible, 'Volumen operum Dei . . . . . . et tanquam Scriptura altera,'[2] 'There are two books of Religion to be consulted—the Scriptures to tell the Will of God, and the book of creation to show His Power.'[3]

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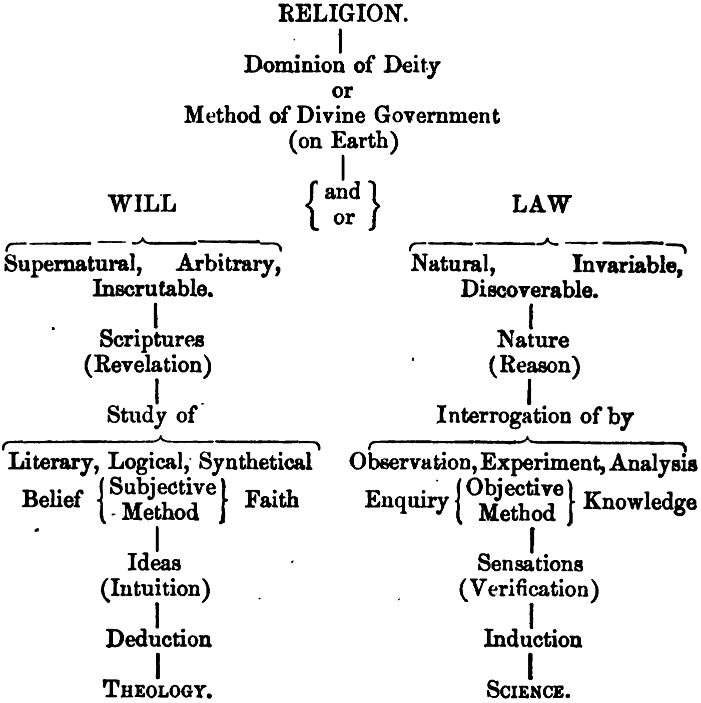
[1] See the article 'Theology,' in the *Penny Cyclopædia*.

[2] Bacon, *Parasceve*, aph. 9.

[3] Ibid. *De Dig. et Augment.*, lib. i.

That the Laws of Nature are in reality Divine commands, and to be studied, reverenced, and obeyed accordingly, is a conclusion subsequently derived from Science, and was first systematically expounded by George Combe, especially in his work entitled 'Science and Religion.'[1]

The following figure exhibits in outline the essential distinctions in the human mind, above and in the foregoing 'Discourse' remarked upon, between 'Will' and 'Law,' and the opposite or distinct methods of thought and enquiry, as well as conclusions, to which each, more particularly, though not exclusively, appears to tend.



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[1] *On the Relation between Science and Religion*, by George Combe, 4th ed., 1857, Simpkin & Co. See also his previous work, *On the Constitution of Man, &c.*, 4th ed., 1830, Longmans & Co.

NOTE D, p. 9.

Prayers for Change of Weather.

The following is a fair specimen of such prayers:—

'O Almighty Lord God, who for the sin of man didst once drown all the world, except eight persons, and afterward of Thy great mercy didst promise never to destroy it so again, we humbly beseech Thee, that although we for our iniquities have worthily deserved a plague of rain and waters, yet upon our true repentance Thou wilt send us such weather as that we may receive the fruits of the earth in due season; and learn both by Thy punishment to amend our lives, and for Thy clemency to give Thee praise and glory, &c.'—*Church of England Book of Common Prayer.*

Of the efficacy of prayer to the Deity to interfere with or control the elements, Bacon's opinion was not doubtful. 'It was well answered' (he says) 'by him, who being shown in a temple the votive tablets of those who had escaped the peril of shipwreck, and being pressed whether he would then acknowledge the power of the gods, asked where were the portraits of those who had perished after making their vows, "Ubi sint illi depicti qui post vota nuncupata perierint?"'—*Nov. Org.* lib. i. aph. 46.

NOTE E, p. 22.

Antagonism between the Baconian Philosophy and Theology.

'The rise of the Baconian philosophy, with its determination to subordinate ancient principles to modern experience, was the heaviest blow which has ever been inflicted on the theologians, whose method is to begin, not with experience, but with principles which are said to be inscrutable.

'Over the inferior order of minds they still wield great influence; but the Baconian philosophy, by bringing their favourite method into disrepute, has sapped the very base of their system. From the moment that their method of investigation was discredited, the secret of their power was gone. From the moment men began to insist on enquiring into the validity of first principles, instead of accepting them without enquiry, and humbly submitting to them as matters of faith and of necessary belief; from that moment the theologians, driven from one post to another, and constantly receding before the pressure of advancing knowledge, have been forced to abandon entrenchment after entrenchment, until what they have retained of their former territory is hardly worth the struggle.'—Buckle, *Hist. of Civilization*, vol. ii. p. 412.

NOTE F, p. 30.

The Universality of Law.

'The growing belief in the universality of Law is so conspicuous to all cultivated minds as scarcely to need illustration. . . . . But though the fact is sufficiently familiar, the philosophy of the fact is not so. . . . . All minds have been advancing towards a belief in the constancy of surrounding co-existences and sequences. Familiarity with special uniformities has generated the abstract conception of uniformity —the idea of *Law*, and this idea has been in successive generations slowly gaining fixity and clearness. Especially has it been thus among those whose knowledge of natural phenomena is the most extensive—men of science. The mathematician, the physicist, the astronomer, the chemist, severally acquainted with the vast accumulations of uniformities established by their predecessors, and themselves daily adding new ones, as well as verifying the old, acquire a far stronger faith in Law than is ordinarily possessed. . . . . Wherever there exist phenomena of which the dependence is not yet ascertained, these most cultivated intellects, impelled by the conviction that here, too, there is some invariable connection, proceed to observe, compare, and experiment; and when they discover the law to which the phenomena conform, as they eventually do, their general belief in the universality of Law is further strengthened. So overwhelming is the evidence, and such the effect of this discipline, that to the advanced student of Nature the proposition that there are lawless phenomena has become not only incredible, but almost inconceivable. . . . . This habitual recognition of Law distinguishes modern thought from ancient thought.'—Herbert Spencer's *First Principles*, part ii. chap. i., 'Laws in General,' secs. 35 & 39.

NOTE G, p. 32.

The Basis of Morality.

If the first principles of morality be derivative, they are embraced by Science; if intuitive, they are partly theological and partly metaphysical. See Lecky's 'History of European Morals,' chap. i., 'Natural History of Morals,' discursive and interesting, but in language and method too rhetorical and vague for anything pretending to be a philosophical exposition of the subject. All female virtue is therein reduced to continence, and physiology simply ignored.[1] See the subject of the true basis of morality more logically treated by Lord Shaftesbury ('Inquiry concerning Virtue:' Characteristics, vol. ii), who agrees with Grotius (De Jure Belli et Pacis, prolegom.) in regarding our human nature, and not any contradiction or disregard of it, as the true foundation of virtue. Morality has now (since Cumberland's 'De Legibus Naturæ') to a very great extent been separated from Theology, but is not yet sufficiently allied with Science. Very few writers appear to have seen, as the fact probably is, that the inductive sciences, in connection with the scientific study of human nature, must be the ultimate source of all genuine morals. The want of appreciation of the truths and methods of the Sciences seems to me to be the weak part of Mr. Lecky's otherwise admirable literary discussion of the subject.

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[1] Chap. v., 'The Position of Women.'

NOTE H, p. 33.

The Census Reports.—On 'The Law of Population.'

It is scarcely possible to over-estimate the value of statistics, which, with the doctrine of averages, constitute so important a department of modern knowledge; and that branch of the subject which is embraced by the Census Reports is most especially valuable. It is to be regretted, therefore, that the compilers of these documents should be permitted to indulge in speculative reasoning on subjects they have evidently but imperfectly studied, or, more probably, are densely prejudiced upon.

The observations in the Census Report for 1861[1] on the 'theory, reasonings, and doctrine of Malthus' (who is referred to as 'a young hasty controversialist'),[2] are perhaps as superficial and fallacious as anything that has ever been penned on the subject. The observations on the 'Laws of Population' in the preliminary Census report for 1871[3] are, in some respects, not quite so bad. The authors therein admit that 'to Malthus belongs the merit of having established by an elaborate statistical induction the law that population grows naturally at rates in geometrical progression, and that this principle deserves to be held as a discovery. The great naturalist of the age (Darwin) recognizes the generality of the law, and, extending it to the whole of the organic kingdom, bases mainly on the resulting struggle for existence his doctrine of the development of the infinite variety of the forms of living nature.' Then follows, however, the assertion of perhaps as extravagant a *reductio ad absurdum* as was ever printed in a public document, viz., that by means of the doctrine of Malthus it is 'easy to prove that even by doubling slowly not only subsistence will be outstripped, but that the whole solar system in the end will be covered by human beings, or other beings increasing by the same law!'

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[1] *Census of England and Wales*, 1861, vol. iii., 'General Report,' pp. 24, 25.

[2] The matured views of Malthus were published when he was sixty years of age. See 6th ed. of his treatise, 1826.

[3] *Census Preliminary Report*, 1871, p. 26.

In the face of the above-cited observations it may surprise the reader to be told that the entire argument of Malthus is based upon certain fundamental facts, which everybody's common sense must, on reflection, show him to be true, viz., that subsistence *cannot* be 'outstripped;' that people cannot possibly exist without subsistence; and that consequently if more are born (as is actually the case) than there is subsistence for, they do not 'outstrip' it, but, in the 'resulting struggle for existence,' they die.

Of course if it can be believed that population can 'outstrip' subsistence, in other words, live without food, there can be no limit to credulity on the subject; at the same time it should be observed, that for the authors of the report to attempt, apparently on this ground, to drag 'the whole solar system' into the discussion is, however original as an idea, really only bewildering.

If the writers of these reports could be induced to turn from the fictions of their imagination to the facts of real life, to study Malthus before flippantly criticising his conclusions, and to contemplate the miserable squalid lives led by the masses of the lower orders (rigidly resulting from their excessive numbers, which are obviously consequent on reckless and unrestrained propagation), they might perhaps be induced to reflect, that their crude and shallow utterances on this vital question, when embodied in public documents of authority, may be, not only worthless, but positively mischievous and cruel.

Statistical collections published on authority ought to be kept pure from the speculations of their compilers of every kind, and be strictly limited to that which forms their real value, viz., analytical, classified, and comparative tables of duly authenticated facts.

NOTE I, p. 34.

'*The Appalling Fact.*'

Nothing probably but debasing and senseless superstition prevents our appreciating in its full force the fact of the astounding number of premature human deaths that habitually occur amongst us, realising in all its horrors the frightful amount of suffering and misery thereby occasioned, and forthwith applying our minds to the discovery of means physical and moral whereby such number may, to a very considerable extent, be diminished.[1]

If a scientific agriculturist were told that there were highly civilised countries in which the breeding of cattle was so conducted, that not one half of the lambs and calves that were born could be reared into sheep and oxen, his astonishment and disgust would be unbounded.

Can it be supposed by any reflecting mind that whilst man, by the use of his intelligence, can so regulate the multiplication of the lower animals as to produce and rear them in normal health, he is using his intelligence aright in abandoning the breed of the superior animal, man, to such recklessness, ignorance, and superstition as everywhere combine to produce the diseased, physically and mentally stunted, and short-lived individuals that form the staple of the masses in the towns and villages of even the most highly civilised countries?[1]

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[1] In the census (1861) the mean actual average of life in England is stated at forty years, which is not, the report says, one half of the natural limit, which it states at one hundred years. In Manchester and Liverpool the actual average is apparently only twenty-five years!

'Be fruitful and multiply' is apparently the only advice ever tendered to our poor on this vital subject by their spiritual guides,[2] who seem utterly oblivious of the fact, that if human beings are encouraged or permitted to, and do in fact, propagate as heedlessly as vermin, the surplus number must be prepared to exist, and undergo extinction, like vermin.

There is no escape from natural inexorable law.

Strange that it should never seem to occur to our teachers, whilst imputing misery and suffering to the inscrutable Will of Deity, that, as a matter of fact, there can be no human misery without an object to be miserable, and that, equally in fact, every such object of misery brought into existence is the direct result of a deliberate act on the part of one, at any rate, of two persons; an act which such person may feel impelled by his animal instinct to do, but which he is by his human intelligence empowered, and often counselled, to forbear to do. This doubtless is an extreme, and to many a repulsive proposition, but, until society is thoroughly roused and startled, and the subject considered from all points of view, relief would seem to be hopeless from the miseries which overwhelm the masses, making their ordinary lives a hideous, ghastly and shocking mockery of the theological idea of the beneficent and special Providence by whose will everything on earth is assumed to be directly ruled, and from whose will, supplicated by prayer, redress alone is to be expected; a state indeed of 'desperation or wretchlessness of most unclean living,'[1] since such miseries are well known to science to be almost entirely traceable to the disproportionate numbers of the people, that is, territorially too many in relation to local means of subsistence, and is a condition of things remediable by human effort.[2]

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[1] 'Man scans with scrupulous care the character and pedigree of his horses, cattle, and dogs before he matches them; but when he comes to his own marriage he rarely, or never, takes any such care. He is impelled by nearly the same motives as are the lower animals when left to their own free choice. . . . . Yet he might by selection do something not only for the bodily constitution and frame of his offspring, but for their intellectual and moral qualities . . . . All ought to refrain from marriage who cannot avoid abject poverty for their children.'—Darwin, *Descent of Man*, vol. ii. p. 403.

[2] Presuming, apparently, 'that the Divine nature takes a delight in swarming the East End of London with paupers.'—Matthew Arnold (*infra*). But the dramatist says by way of malediction,

> 'Drudge to feed loathsome life; get brats and starve.'
> Otway's *Venice Preserved*, act i. scene 2.

There is no difficulty in peopling the earth, which is now known to be a comparatively very small globe,[3] that can only sustain a limited number; and the time when such limited number will be reached is, in relation to our present ideas and conduct on the subject, a question of simple arithmetic, and not apparently so very remotely distant.

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[1] The forcible language of the 17th Article of the Church of England.

[2] 'No one whose opinion deserves a moment's consideration can doubt that most of the great positive evils of the world are in themselves removable, and will, if human affairs continue to improve, be in the end reduced within narrow limits. Poverty, in any sense implying suffering, may be completely extinguished by the wisdom of society, combined with the good sense and providence of individuals. Even that most intractable of enemies, disease, may be indefinitely reduced in dimensions by good physical and moral education, and proper control of noxious influences, while the progress of science holds out a promise for the future of still more direct conquests over this detestable foe. . . . All the grand sources, in short, of human suffering are in a great degree, many of them almost entirely, conquerable by human care and effort.'—Mill's *Utilitarianism*, p. 23.

[3] 'This earth is a globe or ball less than 8,000 miles in diameter, of which the substance is drawn and held together in a rounded form by the mutual attraction of the component particles. Very slowly have the facts been ascertained which prove the truth of these assertions.'—Dr. Neil Arnott's *Elements of Physics*, 'Astronomy,' sec. 1.

The earth existed for probably millions of ages before the appearance of its human inhabitants,[1] and there is nothing from which science can infer any obligation, imposed by the Creator upon man, unreflectively, to do his utmost completely to cover its surface with human beings, in the course of some few thousands of years, and that, too, by so reckless, wanton and unintelligent use (probably abuse) of his animal powers of reproduction, as must necessarily cause misery and suffering, so vast and overwhelming in their aggregate,[2] and so awful in their contemplation, as the

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[1] 'Geologists of all religious creeds are agreed that the earth has existed for an immense series of years, to be counted by millions rather than by thousands.' ('On the Mosaic Cosmogony,' by C. W. Goodwin, M.A.: *Essays and Reviews.* Parker, 1860.) 'No greater folly can be committed than to think to serve the cause of truth by contracting the long periods of geology into the compass of a few thousand years. . . . The human species are among the most recent products of the Creator's power.' ('Dissertation on the Reasons for assigning a very high Antiquity to the Earth.' Pye Smith's *Geology and Scripture.* Bohn, 1854.) 'Though it is yet premature to hazard any opinion as to the date of man's first appearance on the globe, every step we descend into the stratified crust is rife with evidence that this earth was the scene of life and enjoyment thousands of ages before man became a partaker of its bounties.'—*Philosophy of Geology,* by David Page, F.R.S.E., F.G.S., pp. 115–129. Blackwood, 1863. See Note M, p. 79.

[2] See Mayhew's *London Labour and London Poor.* The terrible truths which are laid bare to us in this work constitute an account of the manner in which hundreds of thousands of our fellow beings are being gradually ground and pressed to death and multiform destruction by hard work and want of food. It tells us of starvation, disease, crime, and every conceivable moral and physical degradation to which these unhappy ones who are born at the foot of our social scale are inexorably doomed. No hope or chance of rising; in the mire they were born, and in the mire they must, sooner or later, with greater or less misery, be engulfed. 'We don't live,' said many of the street folk to Mr. Mayhew, 'we starve.'

'I think the inference of those who walk the streets of London from their observation of what is passing there might naturally be alleged result of obedience to the will of Almighty Power, as to be in themselves sufficient to justify the theological conclusion that 'It is hard to believe that God has never cursed his creatures.'[1]

The real difficulty is, how to maintain—that is, feed, clothe and educate—the people when they are here.

It is sad to think how little Science, with all its splendid discoveries, will be able to effect practically for the elevation of the masses until this question of over-population is seriously and generally faced and dealt with. All cheapening of the necessaries of life, all breaking down of trade monopolies, and freeing commerce from restriction, all legal and political reforms, all improvements even in the medical art, have had little other result hitherto than so to stimulate the production of human beings, or to preserve those that would otherwise perish,[2] as in a few years to create a greatly augmented number of the indigent or wage-receiving class, from whose ranks a proportionably increased number are being continually cut off by disease, low-living, and the various other penultimate forms of starvation that constitute the 'terrible correctives' of redundancy,[3] whereby Nature is ever silently asserting her supremacy, and reducing the numbers of the people to precisely that inexorable limit, which the *de facto* resources of the country for the time being can sustain.

Nothing is more clearly known to Science than that the rate of wages depends almost solely upon two things, viz. the amount of the wage-fund and the numbers of the people

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that it would be good for ninety-nine hundreds of its people if they had never been born.'—*Rev. F. D. Maurice.*

[1] Theodore Parker, *Discourse on Matters pertaining to Religion.* Parker, whose large and cultivated mind soared far above the shibboleths of superstition, discusses the dogma of the curse not as a truth, but as the reverse of truth.

[2] 'In the struggle for existence as many more individuals are born than can possibly survive.'—Malthus, cited and corroborated by Darwin, *Origin of Species*, Introduction. Murray, 1861.

[3] Smith's *Wealth of Nations*, by M'Culloch, note 'Population.'

amongst whom it is distributable.[1] That such people, in relation to wages, are, in the eye of science, simply a commodity—labour, whose value depends upon supply and demand. That high wages, *i.e.* a command of the comforts and luxuries of life, are clearly impossible without a relatively diminished supply of labour, with more intelligence in its possessor, on the one hand, or an increase of the wage-fund, on the other.[2] Whether the wage-fund can at any given moment be increased is nearly always a question; but there can be no question whatever that the people, elevated in intelligence, would have it in their own power to control and diminish the supply of labour, to render such diminished supply more valuable, and by thus obtaining higher wages raise their own standard of existence.

Instead of prejudicing the public against acquiring a knowledge of these truths by stigmatising such knowledge as 'the dismal science,' every pulpit in the land would be usefully occupied for years to come in disseminating and impressing them upon the minds of the people at large, and the result of their intelligence being awakened to the fact of the inexorable operation of these natural laws, and to the fact that human welfare is involved in obedience to their dictates, would certainly have the effect of rendering the lives of the majority far less 'dismal' than they are at present; for it is an equally well known scientific fact, that the highest attributes of life, whether vegetal, animal, or human, regulated by science in accordance with natural law, are health and happiness, and in each individual, its own proper virtue. We all recognise this result in the luxuriant foliage and exuberant bloom of the flower reared and tended by science; in the hilarity and joyousness of the lower animal life reared and tended in like manner. It is sheer superstition that supposes human life destined to be an exception to this beneficent law, a superstition utterly destitute of proof, and every day becoming more exploded by experience, and the accumulating evidence of the unbroken continuity of Nature.[1]

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[1] It is indeed now an elementary proposition. See Smith's *Wealth of Nations*; M'Culloch's *Principles of Political Economy*, part iii. chap. ii.; J. S. Mill's *Ditto*, book ii. chap ii.; Professor Fawcett's *Manual of Political Economy*, chap. viii.

[2] 'In fact there are no means whatever by which the command of the labouring class over necessaries and conveniences can be enlarged, other than by accelerating the increase of capital as compared with population, or by retarding the increase of population as compared with capital; and every scheme for improving the condition of the labourer which is not bottomed on this principle, or which has not an increase of the ratio of capital to population for its object, must be completely nugatory and ineffectual.'—M'Culloch, *ubi supra*, p. 380.

I will conclude this note with a quotation which, having regard to the source whence it proceeds, deserves attention: 'A man's children are not merely sent, any more than the pictures upon his walls, or the horses in his stable are sent; and that to bring people into the world when one cannot afford to keep them and oneself decently and not too precariously, or to bring more of them into the world than one can afford to keep thus, is . . . . . by no means an accomplishment of the Divine Will or a fulfilment of Nature's simplest laws; but is just as wrong, just as contrary to the Will of God as for a man to have horses, or carriages, or pictures, when he cannot afford them, or to have more of them than he can afford; and that in the one case, as in the other, the larger the scale on which the violation of reason's laws is practised, and the longer it is persisted in, the greater must be the confusion and final trouble.'[1]

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[1] Assuming it to be 'a true belief that God desires above all things the happiness of his creatures, ... the multiplication of happiness is, according to the utilitarian ethics, the object of virtue.' —Mill's *Utilitarianism*, pp. 27, 31.

'We shall see that the more we investigate, the more we find that in existing phenomena graduation from the like to the seemingly unlike prevails . . . . how, as science advances, the continuity of natural phenomena becomes more apparent. . . . . We are forced by experience, though often unconsciously, to believe in continuity as to all effects now taking place. . . . . satisfied that continuity is a Law of Nature, the true expression of Almighty Power.' —Grove's *Discourse on Continuity*, pp. 280, 319, 342, 344. (Correlation and Continuity.) Longmans, 1867.

NOTE J, p. 42.

Oersted's Discovery of Electro-Magnetism.

Hans Christian Oersted, born at Rudkjoking, in the island of Langeland, 1777, in the year 1820 discovered 'Electro-Magnetism,' or the law of reciprocity between electrified bodies and the magnet.

'Oersted of Copenhagen found that the natural direction of a magnetic needle, such as is used in the mariner's compass, was instantly changed by its being near a voltaic battery in action. Such a needle happened to stand on a table where the wire of a battery lay parallel to it. It had its usual direction of north and south when the battery was not acting, but the moment the current was allowed to pass, the needle was thrown or deflected into a position across the wire, and so remained as long as the current continued. On the current being arrested, however, by unclosing or breaking the voltaic circuit, the needle resumed its natural direction. Pursuing the investigation, Oersted found that the movements of the needle were produced as often and quickly as the acts of closing and unclosing the circuit could be repeated. He further ascertained that, near the wire, the changes took place as certainly and rapidly at any distance from the battery as near to it. These facts announced to some clear understandings the coming prodigy of the electric telegraph.'—Dr. Neil Arnott's *Elements of Physics*, part ii. 'Electro-Magnetism,' p. 627, ed. 1865.

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[1] *Culture and Anarchy*, an Essay, &c., by Matthew Arnold. Smith, Elder & Co., 1869. When we consider who Matthew Arnold is—his antecedents, training, and academical position—this extract from his writings is very remarkable, and shows, I venture to think, that, like his late highly-gifted father, he has within him the 'mens divinior' that, bursting the cerecloths of 'culture,' and throwing off the superincumbent mass of collegiate lore and theological tradition, seeks relief by flashing forth long pent-up truth, regardless whose prejudices or superstitions may be shocked by it.

NOTE K, p. 42.

The Characteristics and Results of the Baconian Philosophy.

'The leading points in the Baconian philosophy stand thus:—Its ultimate purpose is the foundation and augmentation of human dominion; the nearest means to that end are supplied by culture, which converts physical force into instruments fitted for man. Now there is no culture without invention, which produces the means of culture; no invention without science, which makes us acquainted with the laws of things; no science without natural philosophy; no natural philosophy without an interpretation of nature that perfects itself according to the standard of experience. From every one of these as so many points of view Bacon may be characterised, for each gives an essential characteristic of his philosophy. He aims at the culture of humanity by a skilful application of natural science; he seeks to attain natural science by a right use of experience. By a correct method he would convert experience into science; by application in the form of invention he would convert science into art; and this he would convert into a practical and general civilisation, designed for the whole race of man. What single name will suffice adequately to denote such a mind? By connecting his points of view in such logical order, Bacon becomes a *great* thinker. By opening the widest prospects into the realm of science, and into the whole sphere of human civilisation, from these points of view, by indicating goals and setting up problems in every direction, so that his system is nowhere brought to a conclusion and dogmatically hedged round, the *great* thinker becomes an *epoch-making* thinker. For it is the peculiarity of epoch-making minds that they are open to the future. Bacon designed no finished system, but a living work, that should be continued in the progress of time. He sowed the seed for a future crop, which was to ripen slowly, and not to attain its perfection till centuries had elapsed. Bacon was well aware of this; he was satisfied to be the sower, and to begin a work which time alone could complete. . . . . The influence of this philosophy extends far beyond the sphere of the learned: it gives a tendency of the mind, which once taken cannot be abandoned. Systems die out, for there is no permanence in forms; but a necessary tendency of the mind founded in human nature is eternal. The nearer a philosophy stands to common life, the nearer its ideas correspond to actual wants, the less systematic it will probably be; but so much the more indestructible will be its weight, so much the more lasting will be its vitality. It is impossible to banish experience from human science, and equally impossible to banish experiment, the comparison of particular cases, the force of negative instances, and the observation of prerogative instances, from the region of experience. It is likewise impossible to deprive human life of the possessions that result from experimentalising experience—namely, natural science and invention; and if all this is impossible, the Baconian philosophy stands secure for all ages.'—Dr. Fischer's *Francis Bacon of Verulam*, &c., pp. 60, 62, 407, 408.

'Ask a follower of Bacon what the New Philosophy has effected for mankind, and his answer is ready: It has lengthened life; it has mitigated pain; it has extinguished diseases; it has increased the fertility of the soil; it has given new securities to the mariner; it has furnished new arms to the warrior; it has spanned great rivers and estuaries with bridges of form unknown to our fathers; it has guided the thunderbolt innocuously from heaven to earth; it has lighted up the night with the splendour of the day; it has extended the range of the human vision; it has multiplied the power of the human muscles; it has accelerated motion; it has annihilated distance; it has facilitated intercourse, correspondence, all friendly offices, all despatch of business; it has enabled man to descend to the depths of the sea, to soar into the air, to penetrate securely into the noxious recesses of the earth; to traverse the land in cars which whirl along without horses, and the ocean in ships which run ten knots an hour against the wind. These are but a part of its fruits, and of its first fruits. For it is a philosophy which never rests, which has never attained, which is never perfect. Its law is progress. A point which yesterday was invisible is its goal to-day, and will be its starting-post to-morrow.'—'Lord Bacon,' by Macaulay—*Macaulay's Works*, vol. vi. p. 222. Longmans, 1866.

NOTE L, p. 42.

On the Mental Training and Knowledge of the Nature and Principles of Evidence, derivable from the study of the Sciences.

From the observation and interrogation of Nature have resulted the Physical Sciences; and, independently of the vast body of verified truths which they have discovered and digested for the benefit and use of man, the study of their methods is especially important with respect to the training of the highest class of the mental faculties, and the instruction of the understanding in the nature and principles of real evidence.

'The use of the physical sciences is to train a class of mental faculties which are ignored, so to speak, by a purely classical or a purely mathematical training,—the observation of external phenomena, and the exercise of the reasoning faculties upon such phenomena. It is the essence of scientific training that the mind finds the objects of its study in the external world.'—Dr. Carpenter's Evidence. *Report of Public Schools Commission*, vol. iv.

'The extension of knowledge especially depends on contact with the external world.'—Humboldt's *Cosmos*, vol. ii. p. 742. Bohn, 1849.

'The faculty of accurate observation, of the classification of facts, of the co-ordination of classes or groups, the management of topics, for example, in their various orders of importance in the mind, giving to a writer or public speaker improved power of classifying all kinds of subjects. . . . Order and method are the faculties which the elements and principles of science are adapted to improve and educe.'—Professor Owen's Evidence. *Report of Public Schools Commission.*

'The study of Physics consists of two processes which are complementary to each other—the tracing of facts to their causes, and the logical advance from the cause to the fact. In the former process, called *induction*, certain moral qualities come into play. It requires patient industry, and an humble and conscientious acceptance of what Nature reveals. The first condition of success is an honest receptivity and a willingness to abandon all preconceived notions, however cherished, if they be found to contradict the truth. And if a man be not capable of this self-renunciation—this loyal surrender of himself to Nature, he lacks, in my opinion, the first mark of a true philosopher.

'The second process in physical investigation is *deduction*, or the advance of the mind from fixed principles to the conclusions which flow from them. The rules of logic are the formal statement of this process, which however was practised by every healthy mind before ever such rules were written. In the study of Physics, induction and deduction are perpetually married to each other. . . . .

'Thus, then, as a means of intellectual culture, the study of Physics exercises and sharpens observation; it brings the most exhaustive logic into play; it compares, abstracts, and generalises, and provides a mental imagery admirably suited to these processes. The strictest precision of thought is everywhere enforced, and prudence, foresight and sagacity are demanded. By its appeals to experiment it continually checks itself, and builds upon a sure foundation.'—Professor Tyndall, *On the Importance of the Study of Physics*, Modern Culture.

'Physical science teaches people to judge of evidence: any one who is generally versed in physical science is accustomed to so many different modes of investigation that he is well prepared to feel the force of whatever is really proof.' —Mill, on *Hamilton*, p. 543.

'The processes by which truth is attained, reasoning and observation, have been carried to the greatest known perfection in the physical sciences. . . . .

'In what consists the principal and most characteristic difference between one human intellect and another? In their ability to judge correctly of evidence. Our direct perceptions of truth are so limited; we know so few things by immediate intuition, or, as it used to be called, by simple apprehension, that we depend for almost all our valuable knowledge on evidence external to itself.'—J. S. Mill, *Inaugural Address to the University of St. Andrews.* Longmans, 1867.

Professor Huxley, in his lecture on 'The Method of Studying Zoology' ('Modern Culture,' p. 119), has made some striking remarks respecting 'that profound ignorance of the value and true position of physical science which infests the minds of the most highly educated and intelligent classes of the community.' With regard to our present curriculum of education, he observes, 'a curious reflection arises. I suppose that fifteen hundred years ago the child of any well-to-do Roman citizen was taught just these same things: reading and writing in his own, and, perhaps, the Greek tongue; the elements of mathematics; and the religion, morality, history, and geography current in his time. Furthermore, I do not think I err in affirming, that, if such a Christian Roman boy, who had finished his education, could be transplanted into one of our public schools, and pass through its course of instruction, he would not meet with a single unfamiliar line of thought; amidst all the new facts he would have to learn not one would suggest a different mode of regarding the universe from that current in his own time. And yet surely there is some great difference between the civilisation of the fourth century and that of the nineteenth; and still more between the intellectual habits and turn of thought of that day and this. And what has made this difference? I answer fearlessly. The prodigious development of physical science—Modern Civilisation rests upon Physical Science.'

Man's intellectual powers are probably so constituted as to act normally always in harmony with truth, and in discord with its contrary; and are probably only to be thoroughly or healthily disciplined and strengthened by the study and investigation of truth, and the habit of correct association of ideas, not founded on incidental or artificial connection, constructed from conventional premises, but on true and important relations arising out of verified facts.

The deteriorating and demoralising effect upon the reasoning faculty that results from too concentrated or exclusive study of a system of false knowledge has never perhaps been sufficiently regarded psychologically, but is nowhere more conspicuously manifest than in the emasculation of mind usually exhibited by the authors of treatises on superstition. If a reader accustomed to the inductive and logical methods of the sciences, and the invigorating study of the works of such inquisitive and cautious writers as Locke, Lyell, Mill or Herschel, or other classics of science, will betake himself to the perusal of the pages of (*e.g.*) Dr. J. H. Newman—the 'Essay on Miracles,' or 'Grammar of Assent,' for instance—he will, I think, experience no difficulty in clearly discerning the very striking phenomenon I am here alluding to.

In another singular work by the same eminent person, 'History of my Religious Opinions (Apologia),' the intellectual process may be distinctly traced by which the natural vigour of the sceptical faculty can be paralysed, credulity cultivated into faith, and a man's mind be made to imbibe such an amount of superstition as shall represent complete saturation.

NOTE M, p. 67.

The Origin of Man.

When and how man first made his appearance on our planet is, at present, a great crux of science; as to the mode, there are apparently but two explanations or theories worthy of consideration: one is the precise and literal statement contained in Genesis, which is in the following plain and unambiguous terms: 'And the Lord God formed man of the dust of the ground, and breathed into his nostrils the breath of life, and man became a living soul. . . . And the Lord God caused a deep sleep to fall upon Adam, and he slept; and he took one of his ribs, and closed up the flesh instead thereof; and the rib which the Lord God had taken from man made he a woman.'[1]

The reconciliation-theory theology, and the mystified views of its advocates[2] make it necessary to observe, that this statement in Genesis must be accepted logically and morally as either literally true or literally false. If true, *cadit quæstio*. Further discussion or enquiry must be as futile as it would be to argue whether two and two can ever make anything else than four. If false, and the mind left at liberty to speculate upon the matter, the only really rational alternative is that now familiarly known as the Darwinian hypothesis. Mr. Darwin's conclusions had been for many years forcing themselves with more or less distinctness upon the attention of naturalists,[1] previously to his placing them before the public in a manner so masterly as to excite universal attention; moreover, his thesis in reality forms a subdivision or corollary of a still grander argument, viz., the evolution of our entire solar system from some primeval fire-mist or nebulous condition of matter; a scientific conception that arose independently in the minds of two of the most illustrious of modern astronomers, viz. Sir William Herschel in England, and M. Laplace in France, and is generally known as the nebular cosmogony.[2]

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[1] *Genesis*, chap. ii. v. 7, 21, 22. There is no refuge from the literalness of this description in resorting to the original tongues. The passages are substantially the same in the Hebrew, Greek Septuagint, and Latin Vulgate. (*Biblia Sacra Polyglotta*, Bagster, 1831.) Bishop Patrick indeed thought it worthy of remark, that the Hebrew and Greek terms translated 'dust,' signify not dry but *moist* dust (!).—*Commentary on the Historical Books of the Old Testament.*

[2] The Duke of Argyll (*Reign of Law*, p. 29) says: 'Out of the dust of the ground,' that is, out of the 'ordinary elements of nature,' and then proceeds to argue that the creation of 'Man—the human pair,' was probably a 'creation by Law,' chap. v. If I understand his Grace, he considers that his argument is consistent with the account of the creation in Genesis. 'Nothing which science has discovered, or can discover, is capable of traversing that simple narrative,' chap. i. p. 26.

The Darwinian idea is in itself very simple, and may be thus tersely stated. Due regard being had to what is *known* geologically, zoologically, and embryologically of the ascending gradations of life, especially in the vertebrate series, and also to the *known* continuity of nature, it is *probable* that man is the evolution or development of some lower animal form, *most probably* of the simian species, from the individuals of which he differs organically less than the higher and lower apes differ from each other. If such idea embodies the truth, then there must have been some intermediate or connecting form or link between the ape and man, 'an ape more anthropoid or a man more pithecoid,'[3] which has not been discovered, and is yet 'missing.'

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[1] Lamarck, Geoffroy St.-Hilaire, the Author of the *Vestiges of Creation*, Mr. Alfred Wallace, and Professor Huxley, may be especially mentioned. See Lyell's *Principles of Geology*, 10th ed., vol. ii. book iii. chap. xxxiv.

[2] *Vestiges of the Natural History of Creation*, 10th ed., p. 12.

[3] Huxley's *Man's Place in Nature*, p. 159. 'The great break in the organic chain between man and his nearest allies, which cannot be bridged over by any extinct or living species, has often been advanced as a grave objection to the belief that man is descended from some lower form; but this objection will not appear of much

The disciplined mind of Darwin is too severely scientific, and his entire view of the subject too profoundly philosophic, to admit of his being supposed capable of stating the proposition at present otherwise than as an hypothesis for future discovery to verify or disprove; but, enunciated even in the most tentative and guarded way, there can be no doubt that to ordinary minds it embodies an idea extremely repulsive, as well as difficult to realise; and such disgust and difficulty have doubtless chiefly resulted from reverential belief in the plain and literal matter-of-fact account of the creation contained in Genesis.

An intelligent friend told me seriously that the impression made upon his mind by Darwin's work, which he had attentively read, was, that the author's views were 'exceedingly funny.' Conversation in ordinary society inclines me to think that my friend's impression is not by any means singular.

To those, however, who are capable of purifying their understandings from all prejudice on the subject, and appreciating at their intrinsic worth the mass of scientific facts which combine to make up the evidence from which the hypothesis in question is the natural and logical outcome, it appears, *as a probability*, simply irresistible.[1]

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weight to those who, convinced by general reasons, believe in the general principle of evolution . . . . Nor should it be forgotten that those regions which are the most likely to afford remains connecting man with some extinct ape-like creature, have not as yet been searched by geologists.'—Darwin's *Descent of Man*, vol. i. pp. 200, 201.

[1] There are some able minds evidently quite incapable of taking this view. 'The various hypotheses of development, of which Darwin's theory is only a new and special version . . . , are indeed destitute of proof; and in the form which they have as yet assumed, it may justly be said that they involve such violation of, or departure from, all that we know of the existing order of things as to deprive them of all scientific basis.'—Duke of Argyll, *Reign of Law*, p. 29.

The above sentiment expresses what the theological cast of mind

The two theories which are the basis of speculations respecting the origin of human life—viz. the 'special-creation-hypothesis,' and the 'evolution (or development) hypothesis' —have been very exhaustively treated by Mr. Herbert Spencer in his *Principles of Biology* (Williams & Norgate, 1864), (part iii.), where apparently all that is at present known, or can be urged on either side, is summed up with singular force and clearness. With respect to the first-mentioned theory (chap. ii.), he remarks, 'The belief in special creations of organisms is a belief that arose among men during the era of profoundest darkness; and it belongs to a family of beliefs which have nearly all died out as enlightenment has increased. It is without a solitary established fact on which to stand . . . . an hypothesis not suggested by evidence, but by lack of evidence . . . . wholly without support, essentially inconceivable, and thus failing to satisfy men's intellectual need of an interpretation, fails also to satisfy their moral sentiments.' On the other hand, with respect to the evolution hypothesis (chap. iii.), he observes; 'In all respects the hypothesis of evolution contrasts favourably with the hypothesis of special creation. It has arisen in comparatively-instructed times, and in the most cultivated class. It is one of those beliefs in the uniform concurrence of phenomena, which are gradually supplanting beliefs in their irregular and arbitrary concurrence; and it belongs to a genus of these beliefs which has of late been rapidly spreading. . . . . This definitely-conceivable hypothesis, besides the support of numerous analogies, has the support of direct evidence: we have positive proof that there is going on a process of the kind alleged; though

has invariably at first asserted of every splendid scientific hypothesis that genius has ever divined. The cosmical conception of Copernicus, Newton's sublime hypothesis of universal gravitation, Oersted's hypothesis of electro-magnetic communication, &c., all alike involved 'such violation of, or departure from, all that' *their contemporaries knew*, as to meet at the outset with similar contemptuous condemnation from a similarly prejudiced class of minds.

the results of this process, as actually witnessed, are minute in comparison with the totality of results ascribed to it. Lastly, that sentiment which the doctrine of special creations is thought necessary to satisfy, is much better satisfied by the doctrine of evolution; since this doctrine raises no contradictory implications respecting the Unknown Cause, such as are raised by the antagonist doctrine.

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